DOCUMENT RESUME

ED 045 647 24 TE 002 138

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TITLE Studies in Convergent Communication: 1. Analysis of Verbal Interaction.
INSTITUTION Johns Hopkins Univ., Baltimore, Md. Center for the Study of Social Organization of Schools.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Bureau of Research.
REPORT NO R-88
BUREAU NO BR-6-1610
PUB DATE Nov 70
GRANT OEG-2-7-06160
NOTE 84p.

EDRS PRICE EDRS Price MF-$0.50 HC-$4.30
DESCRIPTORS *Communication (Thought Transfer), Convergent Thinking, Interaction Process Analysis, *Language Research, *Language Usage, *Oral Communication, Problem Solving, Sociocultural Patterns, *Sociolinguistics

ABSTRACT

This report, the first of a series of three, describes a study of the structure and use of language in a defined type of communication situation. Following a review of psycholcgical, sociolcgical, and linguistic studies dealing with the structure of communicatien or the structure of discourse, a type of goal-directed (convergent) communication is defined in which consisten patterns of language use are expected to occur. The language of 48 dyads of children and 24 dyads of adults was observed in three standard convergent communication situaticns and used to develop a system for analyzing the verbal interaction. This sytem defines the structural units of the communications and permits a description of the behaviors, the connecting structural relationships, and the content which occur in and between utterances during the communication process. Appendices contain a manual used to instruct coders in the use of the system and the estimates of inter-judge agreement obtained with the manual. (Author/JM)

ED 045647

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STUDIES IN CONVERGENT COMMUNICATION:

I. ANALYSIS OF VERBAL INTERACTION

Report No. 88

Grant No. OEG-2-7-06160

BR 61610-04

TE 002 138

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November, 1970

Published by the Center for Social Organization of Schools, supported in part as a research and development center by funds from the United States Office of Education, Department of Health, Education, and Welfare. The opinions expressed in this publication do not necessarily reflect the position or policy of the Office of Education, and no official endorsement by the Office of Education should be inferred.

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Acknowledgements

The authors gratefully acknowledge the cooperation of principals, teachers and staff members of the elementary schools and state colleges in which the data for this study were collected. Deserving of special, though necessarily anonymous, recognition are those students who willingly and enthusiastically carried out the problem-solving tasks.

Miss Ellen Dickstein and Mrs. Leslie Schnuelle coded the transcripts of the communication tasks. Their conscientious effort was an important contribution to the study. Miss Dickstein also carried out the tests of inter-judge agreement. Her responsibility and thoroughness are acknowledged with thanks.

Abstract

This report describes a study of the structure and use of language in a defined type of communication situation. Following a review of linguistic, psychological and sociological studies which deal with the structure of communication or the structure of discourse, a type of goal-directed or convergent communication is defined in which consistent patterns of language use are expected to occur. The language of 48 dyads of children and 24 dyads of adults was observed in three standard convergent communication situations and used to develop a system for analyzing the verbal interaction. The system defines structural units of the communications and permits a description of the behaviors, the connecting structural relationships, and the content which occur in and between utterances during the communication process. The manual used to instruct coders in the use of the system and the estimates of inter-judge agreement obtained with the manual are presented in appendices.

Preface

This paper is the first of a series of three reports on a project of the Language and Communication Program. The purpose of the project is to study how children exchange information in problem-solving situations. Two principal areas of research are 1) the study of the speech behavior in these communication situations and 2) the search for determinants of accuracy in carrying out the problem-solving tasks. Underlying both areas of research is the attempt to delimit a type of communication situation which 1) would show consistent linguistic and interactional characteristics and 2) would serve as a framework in which behaviors and factors contributing to accurate solutions could be identified. Accordingly, three tasks representing the defined type of communication were developed and were administered to children and to adults.

The first report deals with the problems of describing the linguistic behavior in the communications and includes a coding manual developed for use in subsequent studies. Evidence of inter-judge agreement in the use of the coding system is also presented. The second report will describe the tasks designed to elicit problem-solving behavior and report on their adequacy as a measure of communication accuracy. The role of status variables and other subject variables in the prediction of communication accuracy will also be examined. The third report will present further results of comparisons of child and adult communications, including structural characteristics of the communications as well as features of strategy related to the principle performance measures.

Introduction

The study of subcultural differences in the form and use of language in school children has considerable relevance to the design of effective instruction and the planning of classroom procedures. The subject of this report is the development of a means for studying the use of language in an academically relevant type of communication.

Inter-individual communication requires more than mastery of the rules of a sound system, of a grammatical system and of a system of meanings. The player in the communication game must identify his opponent (or interlocutor), assess the objective of the game, weigh the various circumstances of the situation such as the location, presence of observers, etc., and he must know the ground rules, i.e., *who is responsible for the moves in the game, how the moves are* sequenced, and what constitutes a violation of the rules. The player then continuously adapts his performance to take into account these diverse and complex factors. Most players who belong to the same community learn to adjust their performance, that is, make appropriate choices of linguistic form and content, in very similar ways.

A framework for examining the conditions of the speech situation relevant to the linguistic choices available to a speaker is provided by Hymes (1967). A number of studies, reviewed by Cazden (in press), have pointed out the effect on speech behavior of the factors of topic, tasks, listener(s) and type of interaction. Characteristics of the speaker, including age, social class, race and sex may interact with these factors of the speech situation to result in differential "competence for use," in the sense developed by Hymes (in press). In other words subcultural differences in language,use such as fluency or syntactic complexity,may appear more or less pronounced depending on one or more factors of the speech situation in which the language samples are obtained. Recent studies have shown that measures of speech behavior may be sensitive to the topic of speech (Williams & Naremore, in press), to the extent of overt elicitation (Heider et al., 1968) or to the type of elicitation situation (Labov, 1966). Even the stage of the speech interaction at which samples are taken (Mohan, 1969)

may reflect differences in syntactic complexity. Such considerations require that investigations of "competence for use" must be carefully designed to control or balance such factors of the speech situation. Furthermore, speaker characteristics present in one situation may often represent an interaction with task, topic or elicitation condition rather than fixed or generalizable characteristics of the speakers.

Most studies relevant to speech behavior in inter-individual communication examine selected aspects of the communication process such as editing following feedback (Glucksberg & Krauss, 1967) or such dimensions of the interaction of participants as demand for talking time or relative amount of speech (Soskin & John, 1963). The latter study is one of the few which has used spontaneous talk rather than experimentally elicited conversation or restricted verbal interaction in the study of inter-individual communication. But one of the most interesting properties of spontaneous conversation is the emergent quality of form as well as of content.

Natural conversation is a dynamic process; each speaker continuously adjusts to the moves of his interlocutor and to the progressive development of the subject(s) of the conversation. The process necessarily results in considerable variation in behavior. And yet observation of inter-individual communication in functionally similar speech situations suggests that there are also patterned regularities that enable speakers to predict with some success certain aspects of the sequence of form and of content. The present approach to the study of children's use of language is an attempt to study the process of inter-individual communication. Although some restrictions have been imposed in an effort to control certain predicted sources of variation, the object of study is to discover a means for describing the structure and use of language in communication.

Background Studies

Studies which deal with the structure of communication or the structure of discourse are found in several different disciplines including linguistics, psychology, and sociology.

Linguists generally concur in considering the sentence the largest

unit of linguistic structure which possesses formal characteristics independent of meaning. A distinction is usually made between statements concerning the syntactic structure of the sentence (the domain of linguistics) and statements concerning, for example, the selection of the topic as opposed to comment, or given as opposed to new in the utterances of connected discourse. As Lyons points out (1969) the latter type of statements are relevant to determining the conditions of deletability and pronominal substitutions governing sequences of utterances. Grimes and Glock (1970) suggest that current studies of connected discourse may, by accounting for phenomena such as deixis, anaphora and ellipsis, offer advantages for the analysis of sentence structure. However, few linguistic studies have attempted to relate sentence structure to the form of utterances in natural sequence. That the immediate context of a sentence may contribute to the analysis of the structure of that sentence at the sentence level is demonstrated by Malone (1967) in his examination of English questions.

One of the major contributions to the unraveling of the several complex systems operating in the structure of discourse is that of Halliday (1967). He postulates the existence of three areas of syntactic choice, transitivity, mood and theme, each of which subsumes sets of options relating the form of the discoursal components to the (strictly speaking) non-linguistic, or pragmatic, features of the speech situation. Of particular relevance is his distinction within the grammar of discourse between <u>theme</u> and <u>rheme</u> (components of a message at the clause level) and <u>given</u> and <u>new</u> (part of the system of information focus which relates a point in the discourse to a previous point or points). This distinction points to a class of options by means of which clauses are sequenced in higher order units of connected discourse. Acknowledging Halliday's contribution, Gleason (1968) stresses the need for the study of discourse structure in contrastive linguistics. He examines the linguistically controlled feature of a single form of discourse, the narrative, in two languages, Kâte and Adamawa Fulani. Of five features identified as relevant to narrative structure, two are discussed:
1) the chain of events, along which the narrative is organized and
2) the identification of the participants and their roles in the

narrative. He analyzes the event-line 1) into actions and their connections and defines the participants 2) as "semologic constituents of narratives related to some or all of the Actions by Roles" (Gleason 1968: 50). He shows how these features may be differently selected and distributed in the different languages. This approach, which employs the stratificational model, has influenced a number of studies of narrative structure, for example, Wise (1968) and Cromack (1968).

A more explicit approach to relating the formal properties of discourse to the function of a discourse is that of Labov and Waletzky (1967). They examine oral English narratives of personal experience to isolate invariant structural units, which are represented by a variety of superficial forms. A narrative is defined as an account which follows the temporal order of the reported events. Clauses are classified by their relationship to this core structure. The narrative of personal experience embodies two essential functions: referential and evaluative. The overall structure of the narrative reflects these functions as well as other, optional, functions.

The previously cited studies provide evidence that certain sequences of sentences form units, that is, entities which exhibit internal cohesion (or, form a 'text'). Most important to our purposes is the evidence that the internal structure of such units can be related to their function in the speech situation. Although the majority of work has been devoted to a single type of unit or text (the narrative), there is evidence that other types displaying different structural properties may be identified.

A quite different approach to the investigation of units larger than the sentence is that of Koen, Becker and Young (1969) in their study of paragraphing behavior. They suggested that paragraphs might exhibit formal cohesive properties as well as semantic coherence, and that paragraphs from different kinds of prose might depend for their cohesion on different proportions of formal as opposed to semantic cues. Paragraph indentations and boundaries were removed from eleven prose passages. In another version of ten of the passages, nonsense paralogs were substituted for noun, verb, adjective and adverb stems, while grammatical endings as well as sentence punctuation were retained. Although inter-judge agreement in marking paragraph junctures was

higher for adults for the English passages than for the nonsense passages, median reliability in determining paragraph junctures for the latter was .75. Passages representing drama and dialogue (and one of four passages classified as exposition) were paragraphed with virtually equal reliability in the nonsense and normal versions. This finding suggests that the dominant cues in these passages were formal rather than semantic. The authors do not attempt to identify the formal cues, but suggest that they may be varied and may interact with semantic cues.

None of the evidence cited thus far directly supports the contention that dyadic communication may exhibit regular cohesive properties or may be amenable to analysis into structural components. In a discussion of the problems of distinguishing among varieties of language, Gregory (1967: 190) points out that, "As yet there is no full systematic statement of the linguistic features which might serve as the indexical markers of a contextual category of conversation mode . . . ." He goes on to list several kinds of recurrent phenomena such as "silence fillers" which are observed to occur in conversational situations. To these could be added the code markers of consultative style (Joos, 1967), a situationally defined variety of speech in which the speaker supplies background information as it is required and in which the addressee participates continuously. Communication attributes are considered as a class of independent variables in the study of communication accuracy (Mehrabian & Reed, 1968). However, although higher level (sequence of ideas) and lower level (serial redundancy of words or passages) organization are listed as possible attributes, no studies are reported which deal with such attributes in natural conversation.

A recent attempt to construct a model for the study of dyadic communication emerges from the field of psychiatry (McGuire & Lorch, 1968a, 1968b; McGuire & Coleman, 1968). The basis of the model is attribution, defined by the authors as "the act of ascribing a set of operating rules about information processing, motives, etc. to another person and modifying one's interactive behavior in terms of these rules" (McGuire & Lorch, 1968a: 222). The class of rules postulated includes rules for language conduct, rules for information coding and decoding

and rules for sentence generation. A finite minimum set of rules is postulated for all conversations. Additional rules would be expected to cluster together to characterize certain 'conversation modes,' which may be further distinguished by rules unique to certain speech locations or to status groups of speakers. Conversation modes discussed by these authors are associational, problem-solving, interrogation and clarification. Several observations that characterize the problem-solving mode of conversation are relevant to the present study and are summarized below:

1) Language is used to convey ideas or knowledge which is related to the goals of the conversation.
2) An established theme is continued for extended periods (apparently as a function of a mutually accepted goal).
3) Statements are measured, i.e., words are carefully selected; rephrasings and hesitations are frequent.
4) Irrelevancy constitutes a rule violation.
5) Explicit agreements can be made on the introduction or treatment of redundancy or on the exclusion or inclusion of relevant points.
6) One participant may not solve the problem alone; both participants must share in the process.
7) There is some form of explicit termination of the mode.

The regular behaviors which have occasioned these observations are to a large extent verbal. However, some more precise manner of identifying such behaviors and relating their form and distribution to the function of a communication would seem to be a prerequisite to understanding the dynamics of conversation.

Finally, a recent study examines patterns of answering questions in the framework of rule-governed social activity (Churchill, 1970). Deviations from the expected chain of behavior (in which questions are answered, QA, QA, QA---) were frequent. The variations were classified and the manner in which the norm, i.e., "A question must be answered," was violated and subsequently accommodated was examined. Churchill (1970) discusses the concept of norm-user, as opposed to norm-follower,

a distinction which is useful in the examination of situationally determined variation in the structure of communication.

Preliminary Work

Several assumptions underlie the approach to the analysis of inter-individual communication. First, if two persons are to engage in any sustained verbal interaction, they must share complex systems of rules which regulate such diverse behaviors as introducing and terminating a topic of conversation, interrupting, responding appropriately to an interlocutor's message, and referring to linguistic and extra-linguistic phenomena. Second, shared rule systems link speech behavior to specific features of the speech situation. For example, the culturally defined features of interlocutor status, purpose or function of the interaction, or mode of interaction select appropriate variants of linguistic and non-linguistic behavior. (By linguistic behavior we refer to features of sentence structure; by non-linguistic behavior we refer to other speech behavior relevant to the verbal interaction such as amount of speech, frequency or length of pauses, frequency of interruptions, and accommodation to feedback.) Third, patterned behavior will result from such shared rules for interaction. Patterned behavior is reflected in the structural features of the verbal communication. Finally, it is assumed that functionally similar types of communication will exhibit similar types of organization and internal structure.

The thesis of this research is that if these complex systems of rules are acquired by members of a speech community, then children's communications will differ from those of adults in structure and/or degree of organization.

Definition of convergent communication. The investigation requires as a first step the identification of a single type of communication. A decision was made to examine communications having a common function: problem-solving. The purpose of the verbal interaction could be expected to place a number of important constraints on the organization of the communication and provide recurrent interaction patterns. For

example, if the observations of McGuire and Lorch (1968b) are correct, then problem-solving interactions would have a relatively low incidence of material irrelevant to the goal or solution, which defines the topic for both participants. Furthermore, as contrasted to the associational mode of communication (casual conversation) " . . . where most cues are either 'non-verbal' or formally carried in the manner of presentation, there are [in the problem-solving mode] few non-verbal or presentational cues to signal that this mode should prevail." (McGuire & Lorch, 1968b: 242) Thus problem-solving communications are expected to exhibit overt, verbal cues related to the continuation of the interaction.

The following characteristics define the type of communication chosen for study:

1) An explicit goal is pursued by
2) an exchange of information provided by
3) overt, verbal cooperation on the part of the participants.

Common to the communications in the defined type is the distinction of a Knower and a Doer function. The Knower is cognizant of the requirements of the form of the final solution; The Doer is aware of the problems involved in reaching the solution and has the responsibility of executing it. These characteristics are found in a variety of natural conversation situations. For example, in the situation in which a student and a school counselor talk together in order to arrange an acceptable academic schedule, the counselor (Knower) is cognizant of course prerequisites, degree requirements and courses offered. The student (Doer) is aware of his interests, career ambitions and previously completed course work. The two cooperate to reach a solution which the student executes, i.e., writes down and takes to the registrar. Another example occurs in the situation in which a customer (Knower) telephones for the delivery of an order to an address which is unfamiliar to the salesman (Doer). The Knower is cognizant of the address and its surrounding neighborhood; the Doer knows his position and his cognitive map of the city. Furthermore, both Doer and Knower may have time limitations. The two work out a solution which the salesman (or his agent) executes. Telephones en route provide the opportunity for continued

interaction, if necessary.

In many natural conversations as well as in all the communications examined here, the execution is conducted during the communication process. Thus, the Knower's communication of the solution is shaped by the Doer's continuous participation, by his active search for information, by his presentation of his point of view and by his provision of concurrent feedback concerning his reception of information and his progress toward the solution.

The dyad is in possession of all information about the problem necessary for solution. However, since the information is distributed 'n an unequal and complementary manner, interaction is necessary to bring the information together for a resolution of the problem. This convergence of information into a task solution is reflected in the designation convergent communication. The term problem-solving refers to the explicit goal of the interaction. (The term consultation could be employed to refer to the Knower-Doer relationship of the participants.) The basic grouping of participants in convergent communication is the dyad.

Description of tasks. Three tasks were devised, the performance of which was expected to elicit convergent communication as defined above. Although the nature of the problem to be solved differs across tasks, each task is constructed to permit the dyad to cooperate verbally in an exchange of information directed toward an explicitly stated goal. The Knower and Doer functions were clearly marked by the distribution of task material and by the requirement that the Doer execute the solution.

The tasks were constructed so that objective measurement of the accuracy of the final solution executed by the Doer could be made independently of the records of the verbal communication.

While performing the tasks, speakers were separated by a visual barrier so that communication by means of non-verbal gestures was impossible. Instructions were used to state the goals of the tasks, but no restrictions were placed on the amount or content of the verbal exchanges the dyad used to reach those goals.

Task I: Picture identification. One member of the dyad holds a card showing a picture of an imaginary creature. The other member holds a page containing seven pictures, one of which is identical to that on the card. The pictures consist of seven variations of one figure which has four attributes each of which may vary independently. Ten subtasks of this task were presented consecutively with the members of the dyad alternating as Knower and Doer. A subtask is terminated when the holder of the array of pictures (the Doer) points out to the administrator the one which he believes matched the Knower's picture. The dyad's accuracy score was computed by counting the number of attributes the chosen and the correct figure had in common.

Task II: Model building. One dyad member holds a completed wooden model of a molecule (but not identified as a molecule to child dyads). The other member (the Doer) has a box of pieces including variously colored balls, sticks of two different lengths and springs. Four subtasks were presented. In the last two subtasks the Doer is given, in addition to a box of pieces, a partially completed model while the Knower again holds the completed model. Members alternated as Knower or Doer. A subtask is terminated when the Doer indicates that he has constructed a model identical to that of the Knower. Accuracy was assessed according to the number and color of balls and number and shape of bonds in the constructed model.

Task III: Map tracing. This task involves tracing a path on a picture map from one landmark to another, e.g., from school to a ball park. Both members hold a map, but the Knower's map has the correct route traced in red. The Doer has a colored pencil which he uses to draw in the map as the Knower directs his course. Two subtasks were presented, and dyad members alternated as Knower and Doer. Accuracy was assessed by counting the number of correct corners included in the drawn path.

Speaker Characteristics. The tasks were carried out by forty-eight dyads of fifth-grade public school children and by twenty-four dyads of adults, students in teacher training programs at two local state colleges. Males and females were equally represented in both sample populations.

Children. A sample of 96 fifth-grade children was selected so that it included Negro and white children from low and middle socioeconomic status (SES) backgrounds. Six dyads of girls and six dyads of boys were selected from each of the four population groups (black, white; low and middle

SES). The selection procedure consisted of selecting four neighborhoods in Baltimore which, according to census-tract data, represented the four populations. Letter-questionnaires were sent home to the parents of the fifth-grade students in the schools serving those neighborhoods, and the sample was selected from those students (approximately 77%) who returned the questionnaires. Information about the occupation of head-of-household was obtained from the questionnaires and rated according to the Hollingshead occupational scale (Hollingshead & Redlich, 1958). Table I presents the characteristics of the four sample population groups.

TABLE I

Characteristics of Speakers (Children)

	Low White	Low Black	Middle White	Middle Black
Neighborhoods:[a]	white urban	black urban	white suburbs	black suburbs
	1st quartile poverty, unemployment and below eighth-grade adult education		4th quartile poverty, unemployment and above eighth-grade adult education	
Family Conditions of Individual Speakers:[b]				
Occupation of head-of-household	below level four	below level four	level four or above	level four or above
% father present in home	91%	58%	96%	92%
Mean number persons in household	5.33	6.46	4.75	4.75
Personal Characteristics:[c]				
I.Q.	Kuhlman-Anderson I.Q. scores fell within a normal range (85-115) for all speakers			
Grade	Normal age grade placement (fifth grade for all speakers)			

[a]Data from 1960 census and several more recent surveys, published in Small Area Analysis of Poverty and Social Problems in Baltimore City, 1964.

[b]Data from letter-questionnaires sent to parents of speakers. Occupation of head-of-household was rated according to Hollingshead occupational scale (Hollingshead & Redlich, 1958).

[c]Data from school records.

Thus, for example, speakers designated low SES Black were Negro fifth graders who lived in a largely black urban neighborhood which was in the first quartile in the 1960 city ratings of unemployment, poverty and below eighth-grade

adult education level. From the letter-questionnaires, it was determined that the heads-of-households for speakers in this group were in occupations designated below level four on the Hollingshead occupational scale. Also, the average number living in a household was 6.46 with a father living in only 58% of the homes. The children in this group, as in the other groups, ranged in I.Q. scores (Kuhlman-Anderson) from 85-115. Their average age was 10 years 1 month (range from 9 years 10 months to 12 years 4 months). This group attended a school which was segregated, i.e., percentage of whites was less than 10%.

Adults. The forty-eight adult speakers (all pre-service teachers) were paid volunteers. Twelve Negro men and twelve Negro women from a predominantly black state college and twelve white men and twelve white women from a predominantly white state college were selected from the lists of volunteers. The SES characteristics of these adults' families are presented in Table II.

TABLE II

Socioeconomic Characteristics of Adult Negro and White Population Groups

Population	Mean no. persons per household	Mean occ. level[a]	Father's level of educ. (yrs.)	Mother's level of educ. (yrs.)
Negro	6.08	4.21	12.57	13.08
White	4.46	3.92	11.74	11.29

[a]Mean occupation level is based on the Hollingshead occupational scale (Hollingshead & Redlich, 1958).

Procedures. The communication tasks were carried out by dyads homogeneous as to sex, race and school or college.

The adults carried out all tasks at one sitting; the children carried out Task I at one session and Tasks II and III at a session several months later. All sessions were recorded, using a Uher (Model 4000) tape recorder and an Electro-Voice microphone located on the barrier between the two speakers. The administrators were white, a male working with male dyads, a female working with female dyads. Standard instructions (worded somewhat differently for children and for adults) were read. The instructions included the following sentences: "You can both ask each other any questions you want to and you can take as long as you want to. The only thing you can't do is look at each other's pictures (models or maps)." The administrators provided no feedback on the correctness of a task solution.

A sample of the recorded conversations was then transcribed. The sample included all ten subtasks of Task I, the third and fourth subtasks of Task II and the first and second subtasks of Task III for adults, and only the second subtask of Task III for children. Transcribers followed a set of transcribing conventions for indicating pause, interruption, unintelligible material, emphatic stress, and several gestures of assent, disagreement or hesitation. Standard English spelling was used except 1) for indication of the merger "of" or "to" with a preceding word, e.g., "gonna" "kinda" 2) indication of word final loss of consonant in finite verb forms, e.g., "It ha (has) long ears" and 3) indication of a mid central vowel /ə/ in finite verb forms "d/ə/ he look tall?" Standard sentence punctuation was not used; instead a set of symbols was employed to represent pauses and utterance final intonation (see Appendix A). Transcribers were instructed to place a question mark at the end of an utterance which they interpreted as a question. Inter-rater agreement on placement of question marks was then checked on a sample from several different transcripts which had been prepared by all transcribers. Agreement among transcribers was high (97%) and therefore subjective interpretation was the sole criterion for marking utterances as questions or non-questions.

The transcripts are the primary material on which the analysis of convergent communication is based. These data have also been examined on potential indices of social class differences in language form and in selection of linguistic alternatives (Garvey & Dickstein, 1970).

The accuracy of the solutions to the three tasks has been assessed, and in the children's communication, where a range of accuracy was observed, the relationship among the accuracy scores on the three tasks was examined. The intercorrelations were significantly positive, ranging from .40 to .49. This relationship among the accuracy of communication in the three tasks provides some support for our assumption that the three tasks represent a common type of communication situation which places similar demands on the participants. Further evidence will be provided in the third report of this series in which the structural characteristics of the dyads' communications will be presented.

The transcriptions of the child and adult dyads from the three tasks were examined with the intent of developing measures of speech

behavior which were directly relevant to the function of the communication.

It may be pointed out that a search of the literature in the field of communication fails to reveal any system of analysis that could be used to study the communication as a behavioral unit. Although relevant studies are too numerous to discuss in detail a few representative approaches can be mentioned. An approach to the temporal characteristics of speech interaction is employed by Soskin and John (1963), who examined spontaneous dyadic conversation on measures of 1) total talking time, 2) demand for talking time, 3) each subject's proportion of the total talking time and 4) average time per utterance. The Interaction Profile developed by Bales (1950) permits the examination of group interaction by means of observer assigned scores for twelve 'verbal' categories. The categories are: shows solidarity, tension release, agreement, disagreement, tension or antagonism; asks for information, opinion or suggestion; gives information, opinion or suggestion. It is difficult to see how the categories could be used to identify either semantic or formal classes of behaviors and thus how they could reveal patterned relationships between speech behavior and communication behavior. An approach which takes the setting and purpose of speech as the basic framework for the analytic system is that of Bellack et al. (1966). This system for the analysis of classroom discourse examines in rather fine detail types of pedogogical moves and types of meanings (substantive, substantive-logical, instructional, instructional-logical) observed in classroom interaction. By far the most comprehensive scheme encountered, this system does suggest the existence of functionally defined units of activity. Furthermore, the reliability of the coding of all major categories of analysis was high, inter-judge agreement ranging from 84 to 96 per cent. Since preliminary examination of the convergent communication transcripts suggested the presence of types of regularities not included in Bellack's system and since his analysis of meaning types is classroom specific, this system could not be adopted.

The Structure of Convergent Communication

Stages. Convergent communication is directed toward a goal. The

participants cooperate to solve a problem or reach a decision. Other objectives of the interaction such as getting better acquainted, making a good impression, or conveying personal antagonisms may be present, but are necessarily secondary if the interaction is to be sustained as a convergent communication. Thus the structure of the communication should reflect in some way the critical function of the interaction.

Natural, spontaneous instances of convergent communication reveal three stages or parts. The opening stage is the orientation stage, which includes a definition of the task at hand ("Mr. Adams, I'd like to talk to you about my course schedule"). This stage may include explicit setting up of rules and procedures for the interaction ("All right, Edward, you show me first what courses you want to take"), as well as assessment of the participants' possession of relevant background information. The complexity and amount of detail occurring in this stage varies with the relationship of the participants to each other and to the task, with the setting and with the requirements of the task. This stage may be preceded by a social routine of greeting or a request for attention ("Can I see you for a few minutes?").

The second stage will be called the task conduct stage which will be comprised of as many parts or groupings as the participants allot to carrying out the objective. The groupings of this stage reflect in their number and ordering the principle components of the task as understood by the dyad. Task peripheral or irrelevant material is grouped separately by the dyad. Any major departure from task conduct proper must be marked or signalled, e.g., "Oh, by the way, --" - anecdote or other peripheral material - "Well, to get back to our discussion/problem/subject --."

The third and final stage is the closing stage. The content is comprised of a summation of progress toward the goal, review or checking of conclusions. This stage usually ends with an explicit acknowledgment of the end of the interaction, whether or not a mutually satisfactory 'solution' has been reached ("I think that's the best we can do since only one section of French IV is offered this semester"). Social routines of leave-taking may follow the closing stage.

These three stages may be observed in naturally occurring, well-formed instances of convergent communication. In an experimental setting, however, instructions may satisfy the function of the first stage in presenting the problem and suggesting procedures. Also, if subtasks of a task are carried out consecutively, procedures may be established and need not be repeated anew at the beginning of each subtask. The closing stage may also be truncated in an experimental setting in which a participant must signal task conclusion to the administrator rather than to his partner in the communication.

Units of Analysis. The stages of a convergent communication are composed of units which stand in a hierarchy. A unit at the lowest level has as its context of occurrence the unit at the next higher level.

The lowest level unit of this analysis is the event. An event is defined as any stretch of speech produced by one participant. It may be voluntarily terminated or terminated by the interruption of the other participant. An event may contain pauses. A simple event is composed of a single clause or portion of a clause. A complex event is composed of two or more structurally related or structurally non-related clauses or fractions of clauses.

The next higher level unit is the exchange. The exchange, corresponding to any two sequential utterances by the dyad, provides the basic unit for the study of interaction. An exchange is composed of two events and the relationship that holds between those events. A sequence of three events forms two exchanges, the exchange 1-2 and the exchange 2-3, as, for example, in the following two exchanges:

1) Take a left at the intersection.

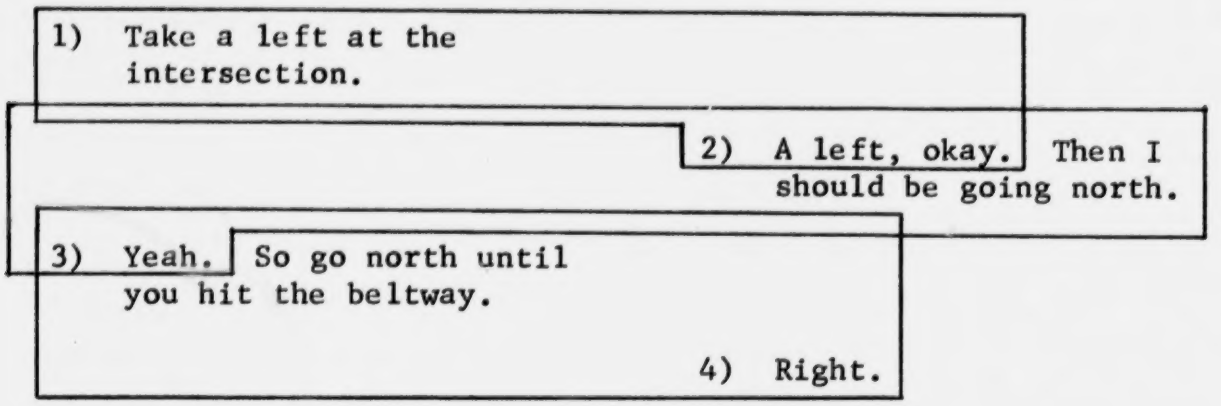
2) The intersection of Belmont and Park?

3) That's it.

Event 2 has, as a component of exchange 1-2, a different function than event 2 regarded as a component of exchange 2-3. This function can only be interpreted in reference to the developing interaction.

If an event is complex (rather than simple as in the example above), the relationship between events in the exchange may not extend

over the entire event. The primacy of the relationship of events in an exchange over the physical extent of the event is illustrated in the example below:


1) Take a left at the intersection.
2) A left, okay. Then I should be going north.
3) Yeah. So go north until you hit the beltway.
4) Right.

Only the first part of the complex event 2 enters into the exchange 1-2. The second part of event 2 enters into the exchange 2-3. Event 3 is also complex.

In many sequences of exchanges there is continuity of form between two non-contiguous events produced by a single participant. The intervening event may be a continuative ("Yeah") or an interrupted interruption from the other participant. Such a grouping of three events is identified as an exchange group. Exchange groups are not essential to the structure of convergent communication but do occur frequently when 1) a listener provides signals of his attention or 2) a listener demands speaking time before the speaker who holds the floor is ready to relinquish it. This example of the latter case illustrates an exchange group composed of exchanges 1-2, and 2-3. (Slash lines represent interrupted events.)

1) Go two more blocks until/

2) but I/

3) until you come to a filling station.

The stages of a convergent communication are composed of one or more complete chunks. The chunk is the highest level unit in this analysis. Chunks, the major building blocks of the communication, are units of content. Each chunk contains a single major theme with other material related to the theme as comment on the theme. The comment may

describe, restrict, clarify, extend or modify the theme in some way. Chunks are the context of occurrence for exchanges and exchange groups.

The unit called the chunk reflects a focus by the dyad on a single major theme. It should be noted that the number of chunks (major themes) in a convergent communication is not determined a priori by the investigator, but results from the dyad's componential analysis of the task. But themes are, Proteus-like, notoriously hard to pin down. The question is whether such a unit can be reliably identified by an observor (O) and, if it can be, what are the cues that signal its limits or its features of internal cohesion. We will discuss some of the more salient cues observed and report on a test of inter-judge agreement on identifying chunks.

Tentatively, five classes of functional rules governing speech behavior relative to the chunk are postulated. The classes of rules refer to establishing, maintaining, enlarging, clarifying and terminating the theme of the chunk. The rules would specify the selection and ordering of formal and semantic features which serve as cues to listeners. If the chunk has psychological reality as a unit in convergent communication, then violations of such rules should cause temporary breakdown in the interaction, which will then require repair work. Evidence of breakdown and repair is found in instances in which a participant (A) fails to establish a new theme after terminating a preceding theme. The second participant (B), who has joined in terminating the preceding theme, will 1) interrupt to request that the new theme be clearly established or 2) provide a response that causes (A) to restate the theme.

Recurrent patterns of exchanges commonly mark the ending of a chunk. Other verbal signals commonly follow those patterns. A juncture point between chunks can often be identified independently of theme determination. (Juncture points are indicated by a double slash.)

//

1) All right, what about the time? Morning or afternoon?

2) Afternoon, I guess.

3) Afternoon?

4) Yeah.

5) Okay.//Now, let me give you my telephone number, just in case.

Exchanges 2-3 and 3-4 check on the thematic information provided in exchange 1-2. Exchange 4-5//resolves the theme and terminates the chunk. A signal of chunk beginning following such patterns is seen in the first event of exchange 5-(6). "Now then--" "All right--" (as in the first event of exchange 1-2) "Okay now--" are frequent signals of the initiation of a new theme.

A theme is established at the beginning of a chunk. In the preceding example, the first event of exchange 1-2 displays a theme established by highlighting; in this case, placing the theme (time) in an independent construction at the beginning of the event. A theme can be maintained by repetition, as in exchanges 1-2 and 2-3, as well as by patterns of substitution by prowords, by parallelism of phrases or clauses or by common dependency of phrases on a preceding element. Discussion of these and other cues to the internal cohesion of chunks is provided on pages 40 through 45 of Appendix A, with examples from the transcripts. It should be pointed out that the identification of all relevant cues to the internal cohesion of chunks is by no means complete, nor is the understanding of their interaction and relationships. For example it is not yet clear whether distinct <u>linguistic</u> differences in the cues which serve to maintain as opposed to those which serve to clarify the theme of a chunk can be demonstrated.

Observations of recurrent patterns of behavior in signalling the beginning and end of the unit and observations of systematic use of cues in establishing a theme and maintaining it over the unit were incorporated into a coding manual. A test of inter-judge agreement on the decision to place a chunk juncture symbol showed that across the three tasks and across three different dyads, chunk boundaries were reliably identified (proportion of agreement = .92). This evidence supports the decision to treat the chunk as a unit in the analysis of convergent communication.

The units, event, exchange, exchange group and chunk form the framework for examining three independent aspects of interaction in the communication: 1) behavior type of the event, 2) content of the event, and 3) structural relationships that hold between the events of an exchange.

Behavior type of the event. As stated earlier the exchange is the basic unit of verbal interaction. However, individuals do initiate events, and these events in some sense represent an individual's intention (which may remain ambiguous to the observer or be misinterpreted or even ignored by the individual's interlocutor). But the event is overt and, in so far as it is subject to interpretation by the interlocutor, is the domain of the three major classes of behaviors which characterize convergent communication activity. We suggest that performance of convergent communication entails three types of behavior: 1) search, 2) presentation, and 3) reception and evaluation. The examination of convergent communication includes the identification of these behaviors and the description of their grouping and distribution in the units of the communication. These behavior types would also be expected to show patterned distributions within the chunks of convergent communication.

An event in an exchange is identified as a behavioral type: Search (S), Presentation (P) or Reception and/or Evaluation (E), or (X) if uncodable. Search may be any kind of seeking behavior, whether self-generated, or other-generated as a response to a Search. Presentation is the provision of information, whether self-generated, or other-generated as a response to a Search. Reception and evaluation behaviors represent a wide range of activities, including signals for continuation (verbal head nods) as well as evaluative events which accept, approve or reject the content of a preceding event. These three behavior types are usually mutually exclusive. Occasionally, however, an event represents two simultaneous behavior types and will require a dual assignment such as PE or SE.

Events which cannot be identified as S, P or E (or SE, PE) are coded X. These include events which are unintelligible to the transcriber, exclamations and interrupted events which are too brief to

interpret. Such events, however, rarely occur in the transcripts.

Identification of the behavioral types, S, P or E, although made for the event, must be determined in the context of the exchanges and evaluated in relation to the role of the participant in the communication. The identification of an event as S, P or E is usually reinforced by the response of the interlocutor, i.e., B's response event is appropriate to the intent of A's eliciting event. If B does not respond appropriately, the behavior type of A's event must be inferred from the observer's knowledge of A's needs. This knowledge concerns 1) A's role in the communication task and 2) A's current state in respect to the progress of the task. The observer (O) makes the identification by predicting the type of behavior expected from A in that situation at that moment.

That O's show a high degree of inter-judge agreement (proportion of agreement = .94) in assigning behavioral types to events produced by other adults is not surprising. Having performed the roles of both A and B in innumerable instances of convergent communication, an O's ability to agree on the intent of an event in context simply reflects his knowledge of the patterning of behavior exhibited by all adult communicators. The explanation of O's reliability in assigning behavioral types to events rests on two arguments developed by John R. Searle (1969). The first relates to the thesis that to speak a language is to have learned and to have mastered highly complex rules. Thus the knowledge that underlies assigned, but not empirically derived, linguistic characterizations is part of a system which allows the observer to use his own language in a highly articulated and systematic fashion. The observer's ability to assign behavioral types derives then not from a statistically based study of sequences of behaviors but from his own command of the rules governing the use of language in convergent communication. The second argument concerns the distinction between regulative and constitutive rules. "Regulative rules regulate a pre-existing activity, an activity whose existence is logically independent of the rules. Constitutive rules constitute (and also regulate) an activity the existence of which is logically dependent on the rules." (Searle, 1969: 34) The rules governing the conduct of communication, we suggest, are constitutive

rules according to which A, B, and O habitually perform. As a further test of this hypothesis a comparison is planned between the inter-judge agreement observed in the codings of transcripts of adult dyads and child dyads. If we hypothesize 1) that the constitutive rules for convergent communication are different, or less well-formed, in children's communications and 2) that the O's no longer possess active mastery of the rules which operate among the child communicators, then we would expect somewhat less agreement in adult O's codings of children's communications than in O's codings of their peers' communications.

Content of the event. This analysis deals with content related to the explicit goal of the communication. Two major categories are set up. The content of an event is task relevant (T), which is defined as content directly forwarding the objectives of the task; or it is task nonrelevant (M). Task relevant events from Task I, for example, refer to the attributes or dimensions of attributes of the imaginary figures as these relate to identifying the correct figure. Task relevant events from Task III refer to directions, distances and landmarks as these relate to transversing the route on the map: "Turn left at the Gino's sign" is task-relevant; "Oh, Gino's. I couldn't read what it says" is task non-relevant.

Task nonrelevant content is further distinguished as management (M_1), or as meta-communication (M_2). By management is meant content that explicitly refers to the activity of carrying out the task, e.g., assignment of roles -- "I'll ask the questions"; reference to timing -- "Let's hurry this up" "Wait a minute don't rush me"; manipulations -- "Let me get a pencil" "Turn your map over, then." Management can also be addressed to self. Such regulatory comments as "I guess that's not a good question" "I wonder if I have the right picture" may be, though overt, not addressed to the interlocutor.

By meta-communication is meant content that refers to the linguistic form of an utterance or to the manner of encoding a referent. Questions of meaning, attempts at more adequate or precise encoding such as qualification, refinement, the various types of paraphrase, are instances of meta-communication. For example: A -- "It's a loop";

B -- "Yeah"; A -- "Actually, you could call it a spiral"; B -- "Okay."

Task nonrelevant content other than management and meta-communication includes continuatives, signals of message reception, e.g., "Yeah" "Okay."

The incidence of whole-descriptive as opposed to part-descriptive encodings of properties of task materials is of interest in a comparison of child and adult communications. The distinction was made between whole-descriptive, or gestalt, encodings (G_1) and massed (three or more), part-descriptive, or global, encodings (G_2). For example, the event from Task II, "This model looks like a dog -- a poodle" is coded (G_1); the event, "It has four legs, a long neck, two ears and a tail" is coded (G_2).

The categories of content given above are not mutually exclusive for a given event. An event may simultaneously or sequentially contain task relevant content and task nonrelevant meta-communication, and thus be coded (TM_2), e.g., "He's wearing a tam, or maybe you'd call it a beret." Or an event may contain task relevant content and a gestalt encoding, e.g., "This figure is an ostrich sort of. It has knobby knees" (TG_1).

Finally, in cases in which the last event in a task is addressed wholly or in part to the experimenter, rather than to the speaker's partner in the dyad, the content of the event is not assigned to a content category, but is coded as a closing utterance.

Content coding, then, includes the following symbols:

T - Task relevant content

M - Task nonrelevant content (other than M_1 or M_2) usually including continuatives, signals of message reception

M_1 - Management content

M_2 - Meta-communication content

X - Unintelligible or uninterpretable content

G_1 - Gestalt content

G_2 - Global content

C - Closing (may be addressed to experimenter)

The last three categories, though useful in the study of speech behavior in the experimental tasks, are not central to a description of spontaneous convergent communications.

Structural Relationships. The relationships that hold between the events of an exchange reflect the mechanics by which the exchange process is carried out. Each exchange is analyzed as representing one of nine possible structural relationships or as representing no relationship (coded 0). In the case that an interruption prevents assignment of a structural relationship, the interrupted exchange is coded separately (as 8).

The term 'structural' is used here to refer to relationships that are based on grammatical features and on features of lexical congruence in the exchange, and on features of a different type which will be called interactional features. The grammatical and lexical features which relate events in exchanges include concord, anaphora, repetition and paraphrase; such features also contribute to the internal cohesion of sentences in a paragraph or of ordered clauses in a narrative. However, in dyadic communication the overt cooperation of the participants is reflected in answering questions, in reacting verbally to directions or statements, and even in responding to responses, e.g., A -- "Take the next left"; B -- "The next left"; A -- "Yeah." We refer to these instances of overt cooperation as interactional features.

In most exchanges grammatical, lexical and interactional features co-occur to form a structural relationship. Repetition and proword substitution occur in this exchange in which A is a statement (in declarative sentence form) and B (in disjunctive, interrogative sentence form) is a question response to A: A -- "The neck curves"; B -- "Does it curve up or down?" Zero anaphora is present in the next example in which A is a question (in polar, interrogative sentence form) and B is an answer response (in the form of a sentence fragment): A -- "Does it have a tail?"; B -- "Yeah, like a rabbit's." The interactional features predominate, however, in an exchange 1) in which the B event concludes an unfinished A event, e.g., A -- "Take the curvey line . . ."; B -- "Up to where the truck is?" or 2) in which the A event makes a

request and the B event shows compliance to the request, e.g., A -- "Keep on describing it"; B -- "The rest of it looks like a poodle."

Normally, absence of structural relationship coincides with chunk juncture. However, exchanges within a chunk may also fail to show a structural relationship. Such exchanges may indicate a temporary breakdown in the chain of activity. For example, A -- "How about the buttons?"; B -- "I'll ask the questions"; A -- "Okay. Go ahead"; B -- "Are the buttons round or square?" Exchange 1-2 (the first two events) fails to show a structural relationship.

A characteristic of many exchanges exhibiting one of the nine possible structural relationships is that the B event seems to be predictable from the A event (A→B). From the standpoint of the observer (and probably from the standpoint of the dyad as well) the A event creates certain expectations. If these expectations are fulfilled, the B event is an <u>appropriate</u> response. In the following example A receives an appropriate response in any one of the set of B events:

A. Attach both springs to the red ball.

B1. Both springs?

B2. They won't fit in.

B3. Okay.

B4. Then what?

The quality of predictability can also be observed (in retrospect) to operate in the direction A←B. That is, given a B event, an A event could be selected as an appropriate antecedent event. For example, given B, we could say that A3 is more likely to have preceded B than A2, A4, or A1.

B. Three whiskers on each side of his face.

A1. Tell me about the feet.

A2. Vicky, do you want to know about the whiskers?

A3. He's got three whiskers.

A4. Okay, I've got it now.

It would appear that the relationship <u>between</u> events might be judged on scales of appropriateness or of acceptability, as the term is

used by Quirk and Svartvik (1966) in their discussion of intra-sentential deviance and normality. In addition to features of lexical congruence and grammatical usage which may operate between events, gradiance might be expected to operate in the area of interactional features as well. Questions initiate a special kind of interactional expectation, for example. A question can be answered, or it can be responded to appropriately though no 'answer' is provided. Or a question can fail to receive either an answer or an appropriate response. In the following example question A receives an answer in B1; it receives an appropriate response in B2. But B3 and B4 would be said to show no structural relationship. (B5 will be discussed below.)

A. How many whiskers does he have?

B1. Three on each side.

B2. You mean those funny lines on this mouth are whiskers?

B3. Gee, it looks like a cat.

B4. Yes.

B5. Quite a few.

The response B1 could lead to an evaluative response and termination of the chunk. Response B2 could lead to an answer ("Yes") which would then permit a subsequent answer to A such as "Six." Response B3, though perhaps lexically congruent, fails to meet the demand of the question for a quantitative answer as does response B4, which is more strikingly deviant in respect to the content-question form of A. Response B5 is apparently acceptable on grammatical, lexical and interactional grounds. However, within the context of the problem-solving tasks (as opposed to more casual or less task-oriented conversation), the A event requires an answer which provides a specific quantifier. Thus A - B5, though appropriate, does not form a satisfied relationship and the following exchange would contain evidence of this as the original question is reput or rephrased, e.g., A -- "Exactly how many?" or A -- "Does it have six whiskers or eight whiskers?"

The relationship in an exchange which is initiated by a question and which receives an answer is called a <u>satisfied</u> structural relationship (A - B1). A relevant, predictable response (A - B2) or (A - B5)

provides an appropriate structural relationship. Exchanges initiated by a question which do not receive answers or predictable responses have no structural relationship (A - B4 or A - B5).

The three-way distinction discussed above is influenced by the behavior of the participants in the convergent communication following on exchanges showing these different types of relationships. However, it should be pointed out that the acceptability of one event in forming an exchange relationship with a preceding event must be viewed as a continuum rather than as three completely distinct points. There are undoubtedly gradations on each of the relevant dimensions, lexical, grammatical and interactional. Furthermore, the inclusion of information on the speech situation (e.g., purpose, participant characteristics, register of the situation) will affect observer judgements of acceptability. The transfer of exchanges from peer dyads engaged in convergent communication to a transcript of a formal interrogation would probably shift (or downgrade) many judgements of 'satisfied' to 'appropriate' for a given exchange.

Examination of the corpus has led to setting up the following categories of structural relationships exhibited by exchanges:

0. No exchange internal relationship.
1. Disjunctive question satisfied by an appropriate response.
01. Disjunctive question receiving an appropriate response.
4. Yes-no question satisfied by an appropriate response.
04. Yes-no question receiving an appropriate response.
6. Content question satisfied by an appropriate response.
06. Content question receiving an appropriate response.
8. Interruption (insufficient material to establish classification).
9. Predication or statement or directive receiving an appropriate response.
10. Predication or statement or directive receiving an appropriate question or request for information.

Categories 0(1), 0(4) and 0(6) are exchanges in which the A event is a disjunctive question, a yes-no question or a content question, respectively, and the B event does not stand in a structural relationship. These categories were included so that the encoding of questions among subjects

could be studied independently of exchange relationships. The assignment of these relationships to exchanges is illustrated in Appendix A, pages 50 through 58.

Coding Procedures. Although the entire transcribed corpus composed of the speech of 72 dyads underlies this analysis of convergent communication, a smaller sample was selected for coding.

> A portion of each task was coded for every dyad. The sample was selected to be representative of the complete task.
>
> In Task I the goal was for one member of the dyad to select the one picture (out of the seven which he held) which was identical to a single picture held by his partner. Four of the ten subtasks of Task I were coded. These were 3, 4, 7 and 8. Because the children were administered all ten subtasks in the same order, this insured that the sample included two tasks with each speaker as the Knower and two tasks with the same speaker as Doer. Because the subtasks were administered in random order to the adults, the four tasks listed above were used only if none was the first one undertaken by the dyad and only if each subject performed the Knower or Doer function an equal number of times. If these conditions were not fulfilled by subtasks 3, 4, 7 and 8, new subtasks were substituted. The order of choice was subtask 3, 4, 7, 8, 10, 6 and 1.
>
> Task II (subtasks 3 and 4) required one subject of the dyad to add pieces to a partial molecular model according to the directions of the dyad who had the complete model. In adult transcripts a very clear "shift" in procedure could be observed. The shift occurred when the holder of the complete model acknowledged an understanding of the form of the partial model held by his partner and began to give directions for completing the model. Also, at this point, there was indication that the Doer began to add pieces onto his partially completed model. Starting at this shift point, thirty exchanges were coded from the fourth of the four subtasks of Task II. The children's transcripts did not always contain a clear shift. If this was the case, thirty exchanges were coded starting from the beginning of the chunk closest to the thirtieth exchange. If there were not thirty exchanges past this point, a portion to be coded was selected which began closer to the beginning of the conversation, but which was beyond any opening orientation exchanges.
>
> Task III required one member of the dyad to draw a route along a map according to the directions of the second member of the dyad whose map had a route already drawn upon it. The sample to be coded was taken from the

second of the two subtasks of the Task and included all the exchanges from the beginning of the conversation until the 'railroad track' was reached, a distance representing nine corners on the map.

The major portion of the coding was performed by two research assistants whose training consisted of studying the coding manual and examining several transcripts previously coded by the author of the system. After a study was conducted which indicated that a satisfactory level of consistency had been achieved (see Appendix B), a general procedure was designed which was followed throughout the coding operation.

The transcripts of all dyads were coded for a single task before a new task was begun. Each of the judges independently coded one half of the dyads. The two coders then re-examined each transcript together. The original coder held his worksheet before him while the second coder, who, prior to this, had seen neither the transcript nor the original codings, made his decisions verbally, directly from the transcript. Discrepancies between the two sets of decisions were reviewed and a coding, satisfactory to both coders, was agreed upon.

The coded transcripts comprise a data base for comparisons of child and adult communication behavior. Such comparisons are now being carried out and will be reported in the third of the present series of reports.

Conclusion

An approach to the analysis of dyadic communication was presented above. The essential features of this approach may be summarized as follows:

1) The attempt to define a single type of communication on the basis of functional criteria is necessitated by the (potential) interaction of factors in the speech situation with participants' choice from among available linguistic alternatives. Thus, the study was limited to the speech of peers in problem-solving tasks which elicit goal-oriented verbal interaction. The functions of the participants in the communications were also defined by the structure of the tasks.

2) Within the single type, units of the interaction were defined. Lower order units, events and exchanges, were operationally defined. A higher order unit of content, the chunk, was postulated to result from

the dyad's focus on a task component, i.e., some aspect of the task isolated by the dyad for attention. Some of the formal and semantic cues which signal chunk boundaries and contribute to the internal cohesion of this unit were suggested. The structural properties of chunks are presumed to contribute to the high level of agreement with which judges (coders) identified this unit across three different tasks in the transcripts of different dyads.

3) The units then provide a framework for more detailed analysis of the process of verbal interaction. Lower order units, events and exchanges, provide a context within which regularities in the complex activity of communication can be observed. By departing from a goal-directed (and thus relatively homogeneous) type of communication, it was possible to identify a small number of essential functions which are manifested in the behaviors of searching, presenting, and evaluating or acknowledging the receipt of information. Patterning of these behaviors in the context of the higher order units can then be studied. An analysis of the content of an event is restricted here to rather broad categories related, again, to the purpose of the verbal interaction. The categories include content directly relevant to the task solution, content relating to management of participant function or to the materials manipulated, and content relating to form or meaning of an encoding. Finally the chaining of speech, the linking of events in exchanges, is examined. Several categories of structural relationships, each an unanalyzed complex of lexical, grammatical and interactional features, are used to describe the steps by which the communication proceeds.

Some questions on the limitations, advantages and possible further application of this approach should be discussed. First, the elicitation of the speech corpus under relatively controlled conditions, though necessary as a first step, raises the question of the adequacy of the analysis for the study of spontaneous, everyday conversation. Informal observation of natural conversation conforming to the definition of convergent communication suggests that the analysis is valid in less controlled situations. However, only further data collection and analysis

can determine what situation and task conditions are necessary to elicit the communication behavior studied here. The present analysis, of course, by no means exhausts the socially or psychologically relevant features of convergent communication. The restriction of content categories, for example, reflects the purpose for which the analysis was developed. Finer, more detailed categorization of content and of structural relationships is possible within this framework and could be developed for other research purposes.

One method employed in this study deserves further comment. The procedure by which a segment of content (the chunk) was described and its description used as a basis for a test of inter-judge agreement results in a unit which appears to have some psychological reality. A more detailed study of the structural characteristics of this cognitive unit can then be undertaken. A study now in progress examines the characteristics of chunks whose boundaries were unanimously agreed upon by judges and will compare those presumably well-formed chunks with others on which judges failed to agree.

The definition of a single type of communication, the search for units of structure and the analysis of these units into functionally relevant categories are procedures which should be adaptable to the study of other kinds of dyadic communication. Verbal interactions which are casual, non-task-oriented, social conversations may perhaps represent several functionally distinguishable types. A casual conversation initiated to avoid silence in a chance meeting or one conducted by acquaintances in a socially defined situation or one that precedes an explicitly task-oriented interaction might be expected to show different structural properties. The behaviors essential to convergent communication (i.e., search, presentation and reception and/or evaluation) may be augmented or in part replaced by other behaviors central to a defined type of casual communication.

The characteristics of verbal interaction in convergent communication identified in this research will be used to compare child and adult performance in problem-solving tasks. The results of the comparisons as well as independent measures of communication accuracy are presented in the third and final report of this series.

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Appendix A

Coding Manual

0. Introduction

Transcripts of the problem-solving tasks represent a convergent or goal directed type of communication which has been defined as convergent communication. In these communications two persons cooperate in a verbal exchange of information in order to reach an explicitly stated goal. During the verbal exchange one of the persons has responsibility for executing the task while the other has information necessary for reaching a correct task solution. In the picture task (Task I) for example, two persons exchange information so that a correct picture may be identified in an array of pictures. This goal is explicitly stated in the experimental instructions. During the verbal exchange one person, the Doer, must identify the correct picture. The result of this distribution of knowledge and execution responsibility is that two functions occur; 1) a Doer obtains information from a Knower about the correct solution and 2) a Knower obtains information from a Doer about the solution in progress. In this coding system, therefore, the analysis of a person's communication behavior is interpreted with respect to his Knower or Doer position in a given Task and subtask.

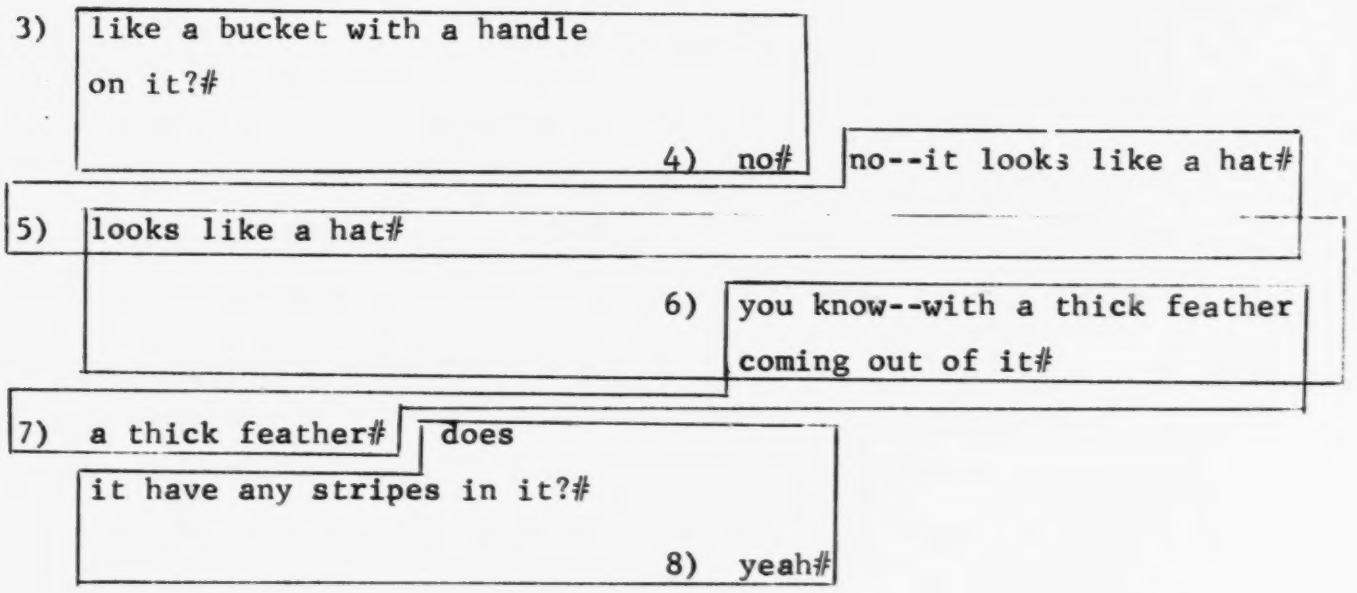
In order to present the coding system, a preliminary discussion and precise definition of the units used to analyze the structure of convergent communication is necessary. First, a complete communication consists of the verbal interaction produced by two persons (a dyad) while performing one subtask. It begins immediately after the experimenter has presented a subtask and ends when the dyad presents the completed subtask to the experimenter.

Often the beginning of a communication is devoted to an orientation stage. The content and length of this stage depend on the task, the relationship of the participants and their familiarity with the problem. The actual conduct of the task objective follows and includes

most of the verbal interaction in the communication. The third, closing stage of the communication may be very brief. It may contain a review, a summing up, or just a final remark addressed to the experimenter. These stages help to describe the content of the communication but the coding system does not require that they be present or identified.

The smallest structural unit in the communication is called the event. An event is any stretch of speech produced by one participant. It may be long or short, continuous or segmented with pause, and it may be voluntarily terminated or interrupted. Events are numbered sequentially for the dyad within a subtask; one participant's events are odd numbers, the other participant's events are even numbers. Interrupted events are indicated on the transcript by a single slash (/). Other symbols on the transcript are question mark (?) which indicates that transcribers identified the event as a question; a double bar (#) which indicates a clause final intonation or voluntary termination of an event. The symbols (?#) at the end of an event mean that the speaker stopped speaking after a question. Double dashes (--) indicate pause or hesitation without clause final intonation. A single term (unh) indicates any one of a class of hesitation forms. The capital letter (U) indicates an unintelligible word or words. No other punctuation is used and an event initial word is not capitalized.

Any sequence of two events forms another unit, the exchange. For example, a sequence of three events forms two exchanges, the exchange between events 1 and 2, and between 2 and 3. An exchange is composed of two events and the relationship that holds between those events. In some cases an exchange must be understood to be composed of only those parts of two events which stand in relationship. Exchanges in the following example are boxed, events are numbered sequentially.


3) like a bucket with a handle on it?#
4) no#
no--it looks like a hat#
5) looks like a hat#
6) you know--with a thick feather coming out of it#
7) a thick feather#
does it have any stripes in it?#
8) yeah#

The coding of events and exchanges are interdependent. Thus, before coding an event, its context, the exchange, must be taken into account. In coding an exchange, both events must be examined.

Exchanges occur in another, larger unit called the chunk. The chunks are units of content. Each chunk contains a single major theme and other material related to that theme as comment on the theme. The comment may describe, restrict, clarify, extend or modify the theme in some way. The number of chunks in the communication (or in the stages within the communication) depends on how the dyad views the task and how the participants go about solving it.

The delimitation of the smaller units, the events and exchanges is given. The delimitation of the chunks requires that judges make decisions about the thematic relationships across groups of events and determine the juncture point between chunks.

The first step in coding is to determine, from the score sheets, which participant is performing which function in the subtask to be coded and which participant speaks first. The coding format requires the placement of a chunk juncture mark and the assignment of 1) a behavioral coding for each event, 2) a structural relationship coding for each exchange, and 3) a content coding for each event. The decisions required for coding will be described in the following four sections.

I. Placement of chunk juncture mark (//)

This section deals with the delimitation of chunks in the communication. The juncture mark (//) will be placed at the end of an exchange that terminates a chunk. Under certain conditions (see section IV) the juncture mark may be placed within an event.

A. Several different kinds of cues will contribute to identifying the beginning of a chunk. No single kind is necessary or sufficient for identifying the beginning of a chunk and several kinds may occur together. The following is a list of markers of chunk beginning:

1a. Lexical items occurring before chunk theme is presented: now, okay now, all right, all right now, all right--now then.

b. Use of title or proper name of interlocutor before chunk theme is presented: Mary--it's some kind of insect#

2a. Syntactic arrangements may signal the beginning of a chunk. The theme, which normally occurs in clause initial position, is further highlighted by placement in an independent position:

his beak--is it--unh--like it's open or close?#

and the legs--four legs with the feet pointing towards the window#

b. In an extreme form such highlighting may locate the presentation of the theme in a separate event at a chunk-initial exchange or exchange group:

13) now that first line#

14) yeah#

15) that first line
is the one you take#

3. Semantic markers of chunk beginning are phrases which call attention to the new theme:

now--what you do--you get a long stick and a black ball#

what else--is he fat?#

let's see--oh--does it have a spring?#

I'm gonna ask another question--does the tail curve over or under?#

4a. Other signals of chunk beginning are change or shift from one designation of participants to another, e.g., <u>you and I</u> in earlier chunks becomes <u>we</u> in a new chunk.

b. Shift in tense of verb phrase, which is continued over several exchanges:

63) take the last turn#

64) okay#//

65) you came up to the corner right?#

66) yeah#

67) and you went past the stoplight?#

68) yeah#//

69) okay now--you will see a clump of trees#

B. The <u>termination</u> of a chunk is usually characterized by an evaluative event or exchange. In general, no additional task information is presented or sought at the end of a chunk.

1. An extreme example of the termination of a chunk is the following:

103) and two at the sides#

104) yeah#

105) okay?#

106) unh huh#

107) you got that?#

108) unh huh#//

109) okay now go back to--to the black ball at the base#

2. Although such examples as 1 (above) are not rare, most chunks are terminated more economically with a single event or exchange:

7) you go around that little house#

8) a little house?#

9) it looks like a little dog
house with a chimney#

10) I see okay#//

11) okay--now go straight#

3. A chunk may be terminated abruptly by an interruption:

29) sticking out from the black
one furthest away from you?#

30) no--I--when you say furthest
away/ //

31) well wait a minute# okay--
let me know what you have#

In reference to the behavioral coding and the structural relationship coding, chunks are usually terminated by E (reception and/or evaluation) and by 0 (no structural relationship), respectively. Content coding is usually M(task nonrelevant). Thus if an event has been coded E 0 M, look for markers of new chunk beginning in the following event or exchange.

C. A change in theme occurs after a chunk juncture. The new theme then obtains throughout the next chunk. There are a number of features which are associated with the internal structure of the chunk. They seem to function to maintain unity of theme in the chunk. The following is a list of features which occur most frequently within a chunk: (The feature illustrated is underlined in the examples, each of which gives a complete chunk.)

1. Repetition. Complete or partial repetition of a phrase or word:

//
72) all right--now you go right/

73) unh huh#

74) until you get past those
first two trees#

75) past the two trees?#

76) yeah# past the two trees#

77) okay#//

78) all right now and you come
up/

2. Substitution by prowords. A preceding element (noun, phrase, clause) is replaced by a substitute, e.g., it for "house," there for "on the left," that for "it has a spring"--"that can't be right." The substitute is interpretable only in reference to the element for which it substitutes.

5) all right--unh--okay does it have antler--well it has black antlers--but does it have red circles at the top of them?#

6) right--yeah#

7) it has red ones?#

8) yeah#//

A further stipulation for using this type of cue to determine the internal cohesion of chunks is that the referent is not the total situation of the task or the total problem of the task (which may be substituted by a generalized "it" as in the first event above) but is a specific single referent which cannot be inferred from the task context.

3. Qualifier of theme or content.

A qualifier or qualifiers may be added to the theme or comment as initially presented.

//

123) put--is there a hole anywhere on the top of it?#

124) not on the top top#

125) all right well not top but around the top#

126) yeah#

127) stick a little yellow ball
in there with a little piece
of--stick# I don't care which
way you go#

128) okay#

129) okay?#

130) unh huh#//

4. Common dependency or parallel structures.

A series of phrases may have an identical grammatical relationship to a preceding element.

//
1) does yours have straight
lines down?#

2) on the feet?#

3) no#

4) on the legs?#

5) no--on the body#

6) yes#//

The three underlined parallel prepositional phrases are all dependent on the noun phrase of the first event.

5. Zero anaphora.

Some part of a complete phrase (recoverable from a preceding event) is dropped rather than repeated or substituted for by a proword.

//
23) whiskers#

24) all right#

25) three whiskers coming from
--extending from either side
of the face#

26) right# how many?# (whiskers)

27) three#

28) okay#//

Another example:

52) okay--now what?#

53) for ears--put two springs in the black ball#

54) wait a minute now--how many black balls have I going here?#

55) you have only <u>two</u> in the entire thing# (black balls)

56) just <u>two</u># okay#//

6. <u>Metaphor or paraphrase</u>. A comparison of one of the terms of the theme or comment(s) is invoked or a new term is substituted for one employed in a preceding event.

//

9) okay# the tail of it--does unh--does it--does it curve outward by/

10) in/

11) or inward?#

12) <u>inward</u>#

13) inward?#

14) <u>like a snail would be</u>#//

Another example:

//

6) what's his hat look like?#

7) unh--what you call it# unh--<u>upside down ice cream cone</u>#

8) upside down ice cream/

9) <u>triangle</u>?#

10) triangle# ok#//

7a. <u>Completion</u> (of one event by the next event). Within a chunk an event may be voluntarily stopped by a speaker and completed by the other speaker. In this example event 13 adds a comment to the stated theme in event 12:

//
12) <u>all the feet</u>?#

13) <u>have balls on them</u>#

14) okay#//

b. Similarly, within a chunk one speaker may interrupt another to complete an event. In the following example comment on the theme is completed:

//
14) it has one two three four five lines#

15) right#

16) <u>going slantwise like from</u>/

17) <u>top to bottom</u>#

18) yeah#//

Chunk boundaries will be marked in subsequent examples of other coding decisions. In the following example, however, several features of chunk structure are explicitly noted. (Events are numbered consecutively.)

Task I:	<u>Doer</u>	<u>Knower</u>
1)	the--whatever it is coming out of his head--is it black or white?#	
2)		out of his head?#
3)	yeah it/	
4)		it has like/
5)	like ears?#	
6)		yeah--they're white#
7)	okay#// unh--the tail is it just a straight line or is it filled in a little bit with black/	
8)		looks like an arrow/
9)	like a little heart shape#	
10)		yeah--well--it a heart/
11)	like an arrow/	
12)		yeah/

13) pointing in this whatever it is/

14) pointing into the body#

15) okay#// the ears are white right?#

16) white unh huh#

17) okay#// the lines on the body are they straight or curved?#

18) sorta curved#

19) okay#//

Event
1. Chunk begins with highlighted theme (whatever)
2. repetition
3. proword substitution (refers to 1)
4. proword substitution (refers to 1 & 3)
5. completion of interlocutor's utterance
6. proword substitution (refers to 5)

Exchange 6-7. evaluative response--chunk end (question in event 1 finally answered)

7. highlighted theme (tail)
8. metaphor
9. metaphor and parallel structure
10. metaphor and repetition
11. repetition (of 8)
12. _____
13. common dependency (arrow/heart shape pointing in--)
14. repetition and completion

14-15. evaluative response--chunk end

15. new theme (ears)
16. _____

16-17. evaluative response
(chunk 15-17 is a short review)

17. highlighted theme (lines)
18. qualifier of comment
19. evaluative response--chunk end.

II. Behavioral coding.

Behavioral coding requires the assignment of a behavioral code symbol or symbols to each event. To make such an assignment, take into account the stage in which the event occurs and the function of the speaker (i.e., Knower or Doer). Then, from the event in its context, the exchange, the intention of the speaker in producing the event can be judged.

A. The overt cooperation between the participants in a convergent communication is reflected primarily in three kinds of behavior: 1) search, 2) presentation and 3) reception and/or evaluation. Search (S) is any kind of seeking, whether the speaker is initiating a search or responding to another speaker by asking a question. Presentation (P) is providing information or direction, whether the speaker is answering a question or making some unsolicited statement. Reception and/or evaluation (E) includes any activities which acknowledge receipt of a message or approve or reject or otherwise evaluate a message. A fourth category (X) includes events which cannot be assigned to one of these behaviors. An (X) event may be unintelligible, it may be interrupted at a point that prevents assignment of S, P or E; or it may simply seem not to fit the three main categories. The latter case may be encountered, for example, when a speaker seems to be 'talking to himself,' e.g., "Whoops."

1. Assignment of S, P, E or X is illustrated below. The necessary information on participant function and his position in relation to the task objective is included.

   Task II. The Knower has just learned the shape of the partial model held by the Doer.

Knower	Doer
13) all right on that black one you had a hole pointing up put a long peg in that ball#	
	14) a long peg a long peg#

15) yeah#

16) okay#

13. P
14. E
15. E
16. E

In event 13 the speaker presents information and gives a direction; event 14 provides evidence of receiving the message; event 15 approves the reception of the message; event 16 indicates the speaker is ready for the next step and closes that chunk.

2. Task III. The Knower has begun to give directions and the Doer is drawing in the route. He has just negotiated a corner. A new chunk begins.

Knower	Doer
	//
	10) then what?#
11) and--then you take a--a left#	
	12) yeah#
13) up--unh--towards the top#	
	14) yeah go past that curve?#
15) yep--no you go along that curve there#	
	16) yeah#//

//
10. S
11. P
12. E
13. P
14. S
15. P
16. E//

In event 10 new, but not specified information is sought; event 11 supplies appropriate information; event 12 acknowledges the information; event 14 questions the scope of the event 13's information; event 15 provides the requested information; event 16 indicates understanding of event 15 and accepts it. The chunk is terminated.

Examples of (X) events will be included in the following sections.

B. An event may require a dual assignment, that is, an event may reflect both search (S) and reception and/or evaluation (E) or may include both presentation (P) and (E). Since dual assignments are usually required when given information is being interpreted, amplified or restated, the behavior of the participants in the preceding exchanges of the chunk should be scanned when there is any question of a dual versus a single assignment.

1. Task III. The Knower begins the task by orienting the Doer to the options at the starting point. The exchanges that follow require dual assignments.

Knower	Doer
//	
1) all right--now right above the school--you see the curved line?#	
	2) okay#
3) taking like--the extreme left line and bringing it down to the curve?#	
	4) unh--the line that's straight unh the left side?#
5) yeah#	
	6) sort of curves in and then out?#
7) yeah#	
	8) okay#//

//

1. P	5. PE
2. E	6. SE
3. P	7. PE
4. SE	8. E//

Event 1 provides information. (The fact that it is in question form is incidental to the behavioral coding, although this fact will be registered in the structural relationship coding.) Event 2 acknowledges reception of message; event 3 continues to provide information; event 4 questions the information and thus is assigned (S). However, event 4 also evaluates the given information by restating it and thus requires (E) as

well. Event 5 responds to the search of event 4 by providing requested information (P) but also evaluates the understanding expressed in event 4, thus (E). Events 6 and 7 form an exchange parallel to 4-5, thus 6 (SE) and 7 (PE). Event 8 is (E) only and terminates the chunk.

It is not necessary to decide which behavior is dominant in making a dual assignment. In other words, if the two behaviors are present, write (S) or (P) and then (E).

2. An additional example is provided to illustrate the difference between a single coding (E) and a dual coding (SE) or (PE). If an event only repeats information verbatim, the speaker's intent is usually interpreted as checking only, that is, as providing evidence of message reception which can then be confirmed by the following event.

Task III. Knower continues to give directions and Doer to draw route. Knower begins new chunk.

Knower	Doer
//	
19) okay and you want to go-- veer left or up north#	
	20) north?#
21) northeast#	
	22) okay#
23) until you get to the-- unh curved intersection#	
	24) okay#//

//			
19.	P	22.	E
20.	E	23.	P
21.	PE	24.	E//

Event 19 gives information and direction. Event 20 checks on the reception of the message, but does not seek further information; thus (E) rather than (SE). Event 21 adds some information while evaluating the previous encoding of events 19

and 20, thus (PE). Event 22 approves (E); event 23 gives completely new information; event 24 assents to it and the chunk is terminated.

III. Structural Relationship Coding.

The events in an exchange are either linked together or have no relationship to each other. When events are linked, they are said to have a structural relationship. Structural relationships are created by features of form and/or meaning. Nine kinds of structural relationships will be distinguished and coded by numbers. No structural relationship is coded by (0). The categories are listed below:

Code

0. No exchange internal relationship
1. Disjunctive question satisfied by appropriate response
01. Disjunctive question receiving an appropriate response
4. Yes-no question satisfied by an appropriate response
04. Yes-no question receiving an appropriate response
6. Content question satisfied by an appropriate response
06. Content question receiving an appropriate response
8. Interruption (insufficient material to establish classification)
9. Predication or statement or directive receiving an appropriate response
10. Predication or statement or directive receiving an appropriate question or request for information.

A. The special cases of no structural relationship (0) and interruptions (8) will be discussed first, but illustrated later in comparisons with the structural relationships.

1. No structural relationship (0). If the second event in an exchange cannot be predicted from the first event or if the first event cannot be used to predict the second event, then no structural relationship (0) is assigned. No

structural relationship between the events of an exchange is a frequent marker of chunk juncture, but this category may also occur within a chunk. A number of different speaker attitudes may be associated with events in an exchange coded (O), as, for example, when one speaker ignores the other, or when one speaker interjects an irrelevant comment. Unintelligible material (U) which prevents the determination of a relationship in the exchange is also coded (O).

2. Interruption (8) is assigned to an exchange in which an interrupted event does not have enough material to allow the coder to identify the relationship in the exchange. In most cases the second event in the exchange shows that the listener as well as the coder was not able to identify the event or to respond to it.

B. Statements and commands, i.e., events of the form declarative or imperative, can be followed by appropriate responses. The appropriate responses are themselves statements, commands or simple responses such as "Yes" "Okay" or are questions, i.e., events of interrogative form. We will call statements and commands nonquestions and distinguish two categories of structural relationships for exchanges having a nonquestion as the first event.

1. A nonquestion that receives an appropriate content response, continuative or any appropriate answer of noninterrogative form is coded (9). The following exchanges are coded (9):

19) keep going straight there#
20) straight--okay#

45) I don't see none there#
46) well put one there#

34) it looks like a bumblebee#
35) yeah--sure#

39) and it has a lot of lines#
40) about seven or eight#

2. A nonquestion that receives an appropriate question as a response is coded (10).

61) go right#

62) right above the factory like?

99) okay what we have here is an anteater#

100) a what?#

20) we're finished#

21) are you sure?#

99) okay# then use a--put a long extension in it#

100) unh which w--pointing which way?#

C. In exchanges in which the first event is a question, the question type is identified as (1), a disjunctive question; (4), a yes-no question or (6), a content question. Then a decision is made as to whether the response satisfies the question, or while not satisfying it, does provide an appropriate response. Given the question "Does it have springs?" (a yes-no question), the response "Yes" or "No" would satisfy the question; the responses "Springs?" or "Do you mean those wires?", while not satisfying the question as put, are appropriate responses.

1a. A disjunctive question that is satisfied by an appropriate response is coded (1). Disjunctive questions are of the form X? or Y? and are satisfied by a response that selects either X or Y.

12) are they long legs or short legs first of all?#

13) long legs#

Accept as (1) an exchange in which the second event provides a synonym for X or Y of the first event:

20) is it pointing up or down?#

21) downwards#

b. A disjunctive question that receives an appropriate response is coded (01). The appropriate response, while not selecting either X or Y is relevant and predictable, but by definition

does not satisfy the disjunctive question.

19) okay now--does it have like beneath the eyes--does it have like triangles or squares?#

20) triangles--like for teeth?#

15) now this camel--is the head up or down?#

16) its pointing out with the body#

2a. A yes-no question that is satisfied by an appropriate response is coded (4). Yes-no questions are satisfied by a response which clearly negates or affirms the question. Yes-no questions themselves have several different forms, all of which may occur as positive or negative:

Inverted order: "Did he go?" or "Didn't he go?"

Intonation-marked: "He went?" or "He didn't go?"

Tag questions: "He went, didn't he?" or "He didn't go, did he?"

15) are they about the same size?#

16) yes#

24) it's not just hanging down?#

25) no--it's straight out#

8) you took a left didn't you?#

9) I took a right there#

b. A yes-no question that receives an appropriate response is coded (04). The response does not clearly negate or affirm, but is relevant to the question.

112) should I go past that unh--parallel--that horizontal line#

113) what do you mean?#

21) can I take that ball off?#

22) which one?#

3. A content question that is satisfied by an appropriate response is coded (6). A content question specifies the nature of the response that satisfies that question. For example, "How many sticks?" specifies a response containing a quantitative term, either exact: "Six," or approximate: "A lot."

29) how about the feet?#

30) they have little balls on the end of them#

42) where should I stop?#

43) at the intersection#

4. In some exchanges that begin with a question there is no structural relationship. In such cases, code the exchanges as no structural relationship (0) and indicate the question type of the first event in parenthesis after the (0) code, e.g., [0(4)].

12) sloppy shoes/

13) what kind of shoes?#

14) and the buttons are/

15) wait a minute#

12. P 8
13. S 0(6)
14. P 8
15. P--

D. Special Problems

1. In the examples of code assignments for structural relationships, the first event of an exchange coded (1, 4 or 6) has been paired with (S) of the behavioral coding. Similarly the first event of exchanges coded (9 or 10) has been paired with (P) of the behavioral coding. However, these two coding systems require independent decisions. Other combinations may occur, e.g., (P 4, S 9, E 6).

Task I

Knower	Doer
1) all right this thing appears to lay on its back right?#	
	2) right okay#//
3) all right the eyeballs are like protruded like a frog's?#	
	4) yeah// is it got unh red streaks in the/

1. P 4
2. E 0//
3. P 4//
4. S --

The Knower is presenting information which he only is sure of; that he uses an interrogative form is incidental to the behavioral

coding. The interrogative forms are noted in the structural relationship coding. The Doer responds to the interrogative form appropriately -- thus a structural relationship coding (4). However, he is not actually responding to a search behavior -- thus the coding of (E) following (P) in events 1 and 2.

Task I	Knower	Doer
16)	he's got unh--one eye with a little curve/	
17)		curved eye?#
18)	curve down#	
19)		curve--unh huh it's like a frown#
20)	right#//	

16. P 10
17. E 4
18. PE 9
19. E 9
20. E --

Event 17 is in interrogative form. The exchange 17-18 is coded (4) since the yes-no question is satisfied with a positive appropriate response. However, event 17 does not represent a search for information but represents evaluative behavior, thus (E) rather than (S).

2. A special type of structural relationship is called <u>interactional</u> and coded [9 (I)]. This type includes exchange relationships in which the first event is a command or direction and the second event represents compliance to the command or direction. For example, a first event, "Keep going" (referring to continuing a description of the model) is linked to a second event which does continue to describe.

Task II	Knower	Doer
16)		sticks for legs and balls for feet#
17)	right go on#	
18)		two little ears--the neck is longish#

16. P 9
17. E 9 (I)
18. P --

Interactional (9), [9(I)] is also assigned to an exchange when the first event enables the second event, that is, when the second event is a direct consequence of the first, as in exchange 24-25 below.

Task III	Knower	Doer
//		
23)	okay--you have one hole left in the red one?#	
		24) right#
25)	stick on a short peg and a yellow with one hole#	
		26) okay#

//

23.	P	4	
24.	P	9(I)	
25.	P	9	
26.	E	--	

Examples

The structural relationship coding categories are illustrated below in two complete chunks, with the behavioral code categories included. Comments on the coding decisions are provided.

Task II	Knower	Doer
//		
10)	okay--another black ball should go on top of that#	
		11) which hole?#
12)	unh--not the one opposite the flat part of the black ball#	
		13) just any one of the others?#
14)	right#	
		15) all right#//
16)	okay--unh--then to two of those holes should be a wire--put a wire in each one of those two holes#	

//

10.	P	10	Statement elicits question
11.	S	6	Content question is satisfied
12.	P	10	Statement elicits question
13.	SE	4	Yes-no question is satisfied
14.	PE	9	Answer receives acknowledgement
15.	E	0//	No structural relationship with event 16, and chunk juncture.

Note that although the dyad begins a new chunk at event 10, failure by the Knower to fully specify a component of the theme results in Doer requesting that information. The fact that ungiven information is requested in event 11 differentiates it from event 13 which does not seek new information but clarification of given information and of receiver's understanding; thus event 11 is (S); event 13, (SE).

Task I (complete subtask)

Knower	Doer
1) well it's a clown with unh/ //	
	2) are the buttons square or circular?#
3) they're circular#	
	4) okay unh#//
5) and there're shoes on his feet/ //	
	6) what kind of hat?#
7) it's unh/	
	8) round or pointed?#
9) pointed hat#	
	10) all right circular or pointed it's a pointed hat#//
11) a wide open rounded mouth#	
	12) okay wide open mouth unh//--are the feet big in comparison to the body or normal size?#

13) they're normal size#

14) all right I got it#

1.	P	0	//	Although interrupted, enough material to code as no structural relationship
2.	S	1		Disjunctive question is satisfied
3.	P	9		Answer-statement receives acknowledging response
4.	E	0	//	No structural relationship and chunk juncture
5.	P	0	//	No structural relationship and chunk juncture
6.	S	0(6)		Content question--but not enough material in event 7 to assign structural relationship behavior
7.	X	8	a)	Interrupted, not enough material to code behavior
8.	S	1		Disjunctive question is satisfied
9.	P	9		Answer-statement receives acknowledgement
10.	E	0	//	No structural relationship; chunk juncture
11.	P	9	//b)	Statement receives acknowledgement; chunk juncture
12.	S	1		Disjunctive question is satisfied
13.	P	0	//c)	No structural relationship--chunk and
14.	---	---	---	communication ends.

Note a) A special unit, intermediate between exchange and chunk, is the exchange group. (see page 66 for further discussion). Events 6-7-8 make up an exchange group. Events 6 and 8 show continuity but are broken by the interrupted event 7. The structural relationship coding is not affected by this distinction. Event 6 does not receive an answer and event 7 cannot be assigned a structural relationship code (or a behavioral code).

Note b) Exchange 11 is made up of event 11 and the first part of event 12. The chunk juncture falls within event 12, but is written on the code sheet after the code line for event 11.

Note c) Although event 14 may be a response to event 13 and thus form an exchange which would be coded (9), it is not possible to decide whether event 14 is addressed to the Knower or the experimenter. As a convention, then, the final event is not assigned a behavioral code, and the next to the last event is assigned (0) rather than (9).

IV. Content Coding

The final coding operation is content coding. Each event is assigned a content code symbol.

A. The major decision required for coding content is whether the content of an event is task relevant or task nonrelevant. The decision takes into account the specific content of each task and the information necessary to carry out that task. Task relevant content is information that is necessary to the solution of the task and directly forwards the objectives of the task independent of the participants' immediate processing of the information. In Task I task relevant information specifies the attributes of the figures; in Task II it specifies the parts and position of parts of the model; in Task III it specifies the route of the map in distance, direction and landmarks or reference points. Task relevant content is coded (T).

Task nonrelevant content is further distinguished as content which refers to the participants' relationship to the task or to each other, content which refers to participants' interpretation of information, or content which refers to the process of information transmission or reception. The first type is called management, coded (M_1). By management is meant content that explicitly refers to the conduct of the task, e.g., assignment of roles--"I'll ask the questions"; reference to timing--"Let's hurry this up" or "Wait a minute don't rush me"; to manipulations--"Let me get a pencil" or "Turn your map over, then." Management can also be addressed to self. Such regulatory comments as "I guess that's not a good question" or "I wonder if I have the right picture" may be, though overt, not addressed to the interlocutor.

The second type of task nonrelevant content is meta-communication, coded (M_2). By meta-communication is meant content that refers to the form or encoding of a message. Questions of meaning, attempts at more adequate encoding of a referent by paraphrase, qualification or comparison belong in this category.

An example of (M_2) is event 19 below.

Task II	Knower	Doer
17)	it's a loop#	
18)		yeah#
19)	actually you could call it a spiral#	
20)		okay#

The third type of task nonrelevant content is coded (M). This category includes continuatives (verbal head nods) e.g., "Unh huh" "Okay" "Right" or other signals of message reception such as repetitions.

1. The following examples include code assignments (T, M, M_1 and M_2). By convention a response to (M) is coded (M), a response to (M_1) is coded (M_1) and a response to (M_2) is coded (M_2) if the response contains no other task relevant content.

Task II	Knower	Doer
23)	no it'd be facing the right# away from the blue ball#	
24)		be facing the right-- away from the blue ball#
25)	right#	
26)		okay#
27)	you have that?#	
28)		yeah#//
29)	now--unh--take a short stick--and connect a red ball--to the black ball#	

23.	PE	9	T	27.	S	4	M_1
24.	E	9	M	28.	P	0	M_1//
25.	E	9	M	29.	P	--	T_1
26.	E	0	M				

Events 24 through 26 all signal message reception (M), event 24 being a repetition and events 25 and 26 simple responses of assent. The content of event 27 refers to the mechanics of the task (M_1); Knower checks on whether Doer is ready to go on. The reply, event 28, is also coded (M_1) since it is a direct response to the event coded (M_1). The content of events 23 and 24 is task relevant (T), referring directly to the components of the task.

2. Multiple assignments of the symbols (T, M, M_1 and M_2) will be necessary if an event contains both task relevant content (T) and task nonrelevant content (M, M_1, or M_2).

Task II	Knower	Doer
		35) I see okay now--from there --I ready the next step#//
	36) then you put a small peg in the black--in the unh--black ball in the back#	
		37) unh huh#
	38) you got that?#	
		39) going away from me right?#
	40) right#	

35.	E	0	M_1//	38.	S	04	M
36.	P	9	T^1	39.	SE	4	TM_2
37.	E	0	M	40.	PE	--	M_2

Event 39 shows a task relevant (T) question which includes an attempt at clarification, a recoding of the instructions, thus (M_2) also.

3. Frequently several events in sequence will be devoted to attempts at recoding the referent, requiring a series of (TM_2) assignments.

Task I	Knower	Doer
		//
		8) unh--how about the feet what kinda shoes?#
9)	he's got on shoes that have like heels and--you know--flat bottoms#	
		10) flat bottoms--would you--say they're like typical clown shoes?#
11)	yeah#	
		12) real long or more like regular work shoes?#
13)	they look kinda like work boots you know what I mean?#	
		14) all right--yeah I think I know what you mean //--

//

8.	S	6	T	12.	S	1	TM_2
9.	P	10	T	13.	P	4	TM_2//
10.	SE	4	TM_2	14.	E	--	--
11.	PE	10	TM_2				

The events 10 through 13 are all task relevant (T) referring to the dimensions of an attribute. However, these events also reflect meta-communication (M_2) in the search for a precise and mutually acceptable description, moving from "flat bottoms" to a comparison "like typical clown shoes" to another comparison, "regular work boots."

B. Another content feature to be coded is the type of reference to the task content. An event may employ a whole-descriptive reference to the material of the task. This type of reference will be called gestalt, coded (G_1). An example from Task I in which the Knower describes the figure is the event, "This looks like a bumblebee." An event could also employ a part-descriptive reference, listing all or several attributes of the figure in the event, "This picture has eight legs, wings, bulging eyes and stripes on its back." This type of reference will be called global content, coded (G_2). Both (G_1) and (G_2) content are more likely to occur in the orientation stage of the communication than in subsequent stages.

1. An event coded for gestalt content (G_1) can contain task relevant material, too. Use code (G_1) for events in which only an image or analogy of the total figure, model or map is mentioned. Use code (TG_1) for events in which an image or analogy of the total figure, model or map is preceded or followed by one or two specific references to an attribute.

Task I	Knower	Doer
		1) bugs Gary#
2) right#//		
		3) red or black dots?#

1. P 9 G_1
2. E 0 G_1 //
3. S - T_1

The relevant response to (G_1) is also coded (G_1) in event 2 above. The next example shows an event coded (TG_1):

Task I	Knower	Doer
		1) are you ready?#
2) unh huh# //		
		3) well this is sort of like-- a bumblebee but it's not really it has--two eyes# //
4) can I okay ask you a question first?#		
		5) yeah# //

1. S 4 M_1
2. P 0 M_1 //
3. P 0 TG_1 //

4. S 4 M_1
5. P 0 M_1 //

2. An event coded for global content (G_2) contains task relevant material by definition, i.e., reference to three or more attributes of features of the task material. Thus, (T) is not written with (G_2). An example of an event coded (G_2) is this first event by the Knower in a subtask of Task I: "Well, he has three buttons, a big round mouth--triangle hat."

An event showing (G_2) content may also contain a gestalt reference (G_1) as in this task initial event: (Knower) "Looks like a clown, the only thing that's colored in are the eyes. It's got three buttons, the line of the feet are not connected."

C. Two further code symbols are used for content coding. First, an event which is unintelligible, interrupted at a point which makes content determination impossible, or which does not fit the other content categories (e.g., an exclamation, "Golly!" or "Damn!") is coded (X).

1. An event coded (X) will usually also have (X) in the behavioral code column and (8) or (0) in the structural relationship code code column.

Task I	Knower	Doer
//		
14)	the head is it unh/	
		15) it's made like a/
16)	upright?#	
		17) it's/
18)	you know--say like in the--unh/	
		19) it's pointed straight ahead#
20)	right unh huh# //	
//		

14.	S	8	T	18.	X	8	X
15.	P	8	X	19.	P	9	T
16.	S	04	T	20.	E	0	M //
17.	X	8	X				

2. The symbol (C) is assigned to the final event if that event can be interpreted as addressed to the experimenter or if it does not clearly warrent assignment of one of the other content symbols. This symbol (C) indicates a closing event.

Task 1--Complete subtask

Knower	Doer
	1) does it look like a bee?#
2) yeah--it looks like a bee with big eyes like a frog# //	
	3) okay# unh--does it have stripes on it?#
4) no it doesn't#	
	5) black stripes?#
6) black stripes# yeah#	
	7) right here#

1.	S	4	G_1	5.	S	4	T
2.	P	9	TG_1 //	6.	P	0	T//
3.	S	4	T	7.			C
4.	P	10	T				

Event 7 is coded (C) as the closing event. It is clearly addressed to the experimenter. No other coding of a (C) event is required.

V. Other Elements of Analysis*

A. The exchange group is a unit composed of three events. Its context is the chunk. The exchange group is always contained in a chunk and never overlaps chunk boundaries. Although marking the limits of an exchange group is not required in the coding, identification of exchange groups will aid in understanding the relationships of the events in the group.

1. The exchange group is composed of an interrupted event, the interrupting event, and the conclusion of the interrupted message in the final event of the group. Not all interrupted events signal the beginning of an exchange group. However, there seems to be a pronounced tendency for a speaker to complete what he starts out to say, and thus many interrupted messages are concluded by the speaker who initiates the message. In the following example, the exchange group is marked by a bracket on the right-hand side of the content code column.

Task I	Knower	Doer
		//
		5) what kind of shoes does he --do they have on?#
	6) regular shoes# square heels--round/	
		7) unh huh#
	8) up front#	
		9) unh--the toe is round and --and the heels are-- rather flat#
	10) yeah# //	

	//				
5.	S	6	T		9. SE 9 TM_2
6.	P	8	T	exchange	10. PE 0 TM_2 //
7.	E	0	M	group	
8.	P	9	T		

*The marking of these elements was not included in the estimates of inter-judge agreement.

Events 6-8 form an exchange group. Event 8 continues event 6, while event 7 (an interruption) appears to have been ignored by the Knower.

2. An exchange group can also be composed of an initial event which though not interrupted has not been completed. The second event may be interrupted by the first speaker who then completes the message of the initial event.

Task III	Knower	Doer
1)	okay you have the school at the left--bottom#	
2)		right#
3)	corner--okay#	

1. P 9 T
2. E 8 M] exchange group
3. P -- T]

B. A chunk may have as its theme a synthesis of previously exchanged information. If the total content of a chunk is devoted to review, that chunk may be marked as a review chunk, by bracketing the entire chunk at the right-hand side of the content code column. Also, a series of exchanges in a chunk may be devoted to review, departing from the major theme of the chunk. The series of exchanges should also be bracketed as review. It is useful to identify review material before continuing with other coding. All coding of material marked as review should then be carried out <u>as if the events and exchanges were encoding new material</u>. The reason for this procedure is that it is often not possible to judge the status of information sought or provided in review material. The coder can refer to earlier chunks to make a decision as to whether the chunk in question contains previously exchanged information. The coder cannot be certain, however, whether the participants remember or have actually integrated information previously exchanged. Thus all review material in a chunk should be coded for behavior, structural relationship and content, as if it was introduced for the first time in that chunk.

Task II	Knower	Doer
		10) unh--where should be the flat--part?#
11)	ok if you're looking at it with the blue on your right the flat part is facing me#	
		12) ok#
13)	you know it's away from you#// ok now in the black one-- you got that?#	
		14) right#
15)	ok now in the black one-- unh--with the hole going to your left--put a peg in it-- with the red ball that has two holes in it#	
		16) make sure you got your left and right right according to me#
17)	yeah--you've got the blue ball on your right--don't you?#	
		18) I've got the blue ball in my right hand#
19)	right--ok# then--ok#//	

10.	S	6	T	15.	P	9	T	
11.	P	9	T	16.	P	10	M_1	review
12.	E	0	M //	17.	S	4	TM_1	
13.	P	4	TM_1	18.	P	9	TM_1	
14.	E	0	M_1	19.	E	0	M //	

The bracketed sequence of exchanges 16-19 is review of a directional topic concerning management which was introduced in event 11 of the preceding chunk. The events of the sequence are coded as if information (blue on Doer's right) is given for the first time.

Practice Coding

The following material is taken from a transcript of the map task (Task III). Space is provided for entry of the code symbols. After coding this sample, turn to the following page and check your coding against the coding which represents the consensus of three judges who participated in a study of inter-judge agreement. If there is any discrepancy between your decisions and those of the judges, return to the transcript and reread the event or exchange in context.

Knower	Doer
	1) okay from the school unh--take--the--thing on the far left unh--that curved line#
2) the curved line that--curves in and then back out?#	
	3) yeah--yeah#
4) all right up to how far?#	
	5) up until that first intersection#
6) yeah#	
	7) and then go over across--to the next intersection along where the truck is riding#
8) take a right so I pass the truck?#	
	9) right#
10) then what?#	
	11) and--then you take a--a left#
12) yeah#	
	13) up--unh--towards the top#
14) yeah go past that curve?#	
	15) yep--no you go along that curve there#

16) yeah#

17) and--then you--ride into that next unh road and rather than--going s--well--follow the straight--unh#

18) take take the line which leads up to the left hand--upper left of the paper?#

19) right#

20) all right#

21) up towards that flag there#

22) all right then what?#

23) then you make a--a right onto that road#

24) all right make a right#

25) until you get to that first intersection#

26) that little line there?#

27) yeah--it connects it to--take that up#

28) yeah#

29) then make another--a left#

30) make a left?#

31) yeah#

32) all right#

33) all right--unh--follow that until you get to that sign or whatever it is#

34) railroad crossing sign?#

35) yes--//

	B[a]	SR[b]	C[c]
1			
2			
3			
4			
5			
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35			

[a] Behavioral Coding

[b] Structural Relationship Coding

[c] Context Coding

TURN THE PAGE

Consensus Coding for Practice Coding Sample

	B	SR	C		B	SR	C
1	P	10	T	19	P	9	TM_2
2	SE	4	TM_2	20	E	0	M
3	PE	10	TM_2	21	P	0//	TM_2
4	S	6	T	22	S	6	M_1
5	P	9	T	23	P	9	T
6	E	0//	M	24	E	0	M
7	P	10	T	25	P	10	T
8	SE	4	TM_2	26	S	4	TM_2
9	PE	0//	TM_2	27	P	9	T
10	S	6	M_1	28	E	0//	M
11	P	9	T	29	P	10	T
12	E	0	M	30	E	4	M
13	P	10	T	31	E	9	M
14	S	4	T	32	E	0//	M
15	P	9	T	33	P	10	T
16	E	0//	M	34	SE	4//	TM_2
17	P	10	T	35	--	--	--
18	S	4	TM_2				

Appendix B

Tests of Inter-Judge Agreement in Coding Convergent Communications

The basic unit for the coding of convergent communication is the event in its relevant context, the exchange. Coding an event requires six decisions.

Decisions 1 and 2 are concerned with the assignment of a behavioral code. The coder must determine whether a statement is a presentation (P), a search (S), an evaluation (E), or, in rare cases, uncodeable (X). Two decisions are required because many two-part combinations of the above categories are possible. If, for example, two coders assign the code symbol letter (P) to a response, they are implicitly agreeing that the response contains no (E). The necessity for making two decisions becomes more obvious in the type of situation in which two coders agree to score a response as (PE).

Decision 3 involves the designation of the structural relationship binding any two events in an exchange. The code assigned such a relationship indicates whether, for example, a statement receives an appropriate response, evokes a question, receives no response, etc.

Decision 4 is concerned with the placement of a chunk juncture marker. This indicator is placed after the final event relevant to a single theme, and the coding requires the observer to choose one of two possibilities (presence or absence of a chunk juncture).

The purpose of decisions 5 and 6 is to characterize the content of a response. This coding involves classification as to task relevancy, meta-communication, global descriptiveness, etc. Here again, the possibility for dual codings makes this a two-part decision, e.g., a task relevant and global descriptive event would be coded (TG_2).

Table I summarizes the types of decisions to be made, and presents some sample assignments. (Interpretations of these codes can be found in the Coding Manual, Appendix A).

TABLE I

Sample Coding Decisions

Behavioral Coding	Structural Relationship	Chunk Marker	Content
1. -- 2. --	3. --	4. --	5. -- 6. --
P --	0	/	T --
S --	1	--	M --
E --	01		T M_2
P E	0(1)		M_1 C_1
S E	4		T^1 C_2
X X			
etc.	etc.		etc.

The material coded included four subtasks from Task I, thirty exchanges beginning with shift point in Task II, and all exchanges from the beginning to the point where Doer reached the fourth corner of the map in Task III. (See page 28 of this report for further description of the coding procedures.)

Three separate procedures were employed to determine the reliability of this coding system. The first procedure was designed to yield an estimate of intercoder agreement. Three coders*, working independently, scored the transcripts of three randomly selected adult dyads (dyad 211-212, white, male; dyad 219-220, white, female; dyad 227-228, Negro, Male). The decisions made by each coder were compared with the decisions of every other coder.

The maximum number of discrepancies between two coders for one event is six. If no discrepancies occur, the agreement score for the event is 100%. One discrepancy reduces the score to 83%; two discrepancies reduce the score to 67%, and so on. The agreement score for each event was determined, and these scores were then averaged to yield an overall agreement score for a task sample (which may differ in length from approximately two or three exchanges to 50

*The first coder was the author of the coding manual. The second and third coders had no part in the development of the coding system, but studied the manual and practiced coding several transcripts before the tests of inter-judge agreement were conducted.

exchanges). The results of this analysis are reported in Table II.

TABLE II

Agreement Between Pairs of Coders

	C1-C2	C1-C3	C2-C3	Dyad	Task average across raters
Task I					
211-212	.93	.92	.97	.94	
219-220	.89	.91	.90	.90	
227-228	.91	.93	.91	.92	
	.91	.92	.93		.92
Task II-4					
219-220	.88	.93	.88	.90	
227-228	.88	.87	.87	.87	
	.88	.90	.88		.89
Task III-6					
211-212	.95	.95	.97	.96	
219-220	.89	.89	.91	.90	
227-228	.86	.92	.86	.88	
	.90	.92	.91		.91

Average Agreement Between Pairs of Coders Across Tasks and Dyads:

C1-C2: .90
C1-C3: .91
C2-C3: .91

Average Agreement on Dyads Across Task and Coders:

Dyad 211-212: .95
Dyad 219-220: .90
Dyad 227-228: .89

Average Agreement Between Pairs Across Tasks and Dyads: .91

An especially striking finding is the level of consistency across the average agreement scores for the three possible coder combinations. Regardless of the particular individuals compared, the agreement scores maintain the same high level. This is an especially encouraging finding, for it indicates that any reasonably qualified individual can learn to use the coding system in a way comparable to any other similarly qualified individual. The agreement scores between tasks also exhibit satisfactory consistency. Agreement scores between dyads vary somewhat, but are still quite high. The overall agreement score for all pairs across tasks and dyads is 91%.

A second analysis was conducted in order to determine the stability of the decisions across the three coders. That is, this analysis attempted to discover to what extent the decisions of a new set of three coders would agree with the decisions of the first set.

Three coders make a total of eighteen decisions for one event. The maximum number of discrepancies, however, is only sixteen due to the fact that the chunking decision is based on only two possibilities, and therefore could never cause more than one discrepancy across three individuals. Using a base of sixteen, the decisions made by all observers were compared for each event. If coders concurred on all decisions, the agreement score was 100% for the event. One discrepancy reduced the agreement score to 94%; two discrepancies reduced the score to 88%. and so on. The results of this analysis are reported in Table III. The average agreement among the three raters across tasks and dyads was 94%. This figure is comparable to the findings of the first analysis. It is slightly higher due to the greater stability that is a consequence of the increased number of coders. The difference however, is not large enough to indicate that the consensus of three coders is significantly more stable than the consensus of two.

TABLE III

Stability Across Three Coders

Dyad	Task I	Task II-4	Task III-6
211-212	.96	---	.98
219-220	.94	.94	.94
227-228	.93	.92	.92
	.94	.93	.95

Average Stability for Dyads across Tasks and Coders:

Dyad 211-212: .97

Dyad 219-220: .94

Dyad 227-228: .92

Average Agreement across Coders, Tasks and Dyads: .94

The final analysis was an attempt to determine whether specific types of decisions were more responsible than others for the observed disagreement. The basic unit for this procedure was the complete task sample chosen for the reliability check. For each type of decision, the proportion of discrepancies out of the total number of that type of decision made by the three coders was computed. For example, in Task I, for dyad 211-213, there were 56 events. The behavioral coding required two decisions for each event. Therefore, each coder made 112 behavioral decisions for that task. With three coders, a total of 336 such decisions were made. Of these, thirteen were discrepant. Thus, there was 4% disagreement, or 96% agreement. For the chunks, since there were only two possible choices, there could be a maximum of only one discrepancy per event across the three raters. Thus, in Task I for dyad 211-213, there were 56 events, and therefore 56 opportunities for discrepancy. The two disagreements that occurred constituted 4% of the total number of chunking decisions.

TABLE IV

Breakdown into Sources of Discrepancy

Decisions:	Behavioral Coding 1 and 2			Structural Relationship 3			Chunks 4			Content Coding 5 and 6			Tasks	
*	O-D	#D	PD	O-D	#D	PD	O-D	#D	PD	O-D	#D	PD	Average Discrep.	Average Agreement
Task I														
211-212	336	13	.04	168	9	.05	56	2	.04	336	12	.04		
219-220	312	25	.08	156	16	.10	52	2	.04	312	23	.07	.06	.94
227-228	420	24	.06	210	18	.09	70	3	.04	420	24	.06		
			.06			.08			.04			.06		
Task II-4														
219-220	180	10	.06	90	3	.03	30	0	.00	180	17	.09		
227-228	180	11	.06	90	10	.11	30	3	.10	180	16	.09	.07	.93
			.06			.07			.05			.09		
Task III-6														
211-212	138	2	.01	69	1	.01	23	4	.17	138	2	.01		
219-220	222	10	.05	111	9	.08	37	7	.19	222	10	.05	.07	.93
227-228	180	11	.06	90	7	.08	30	2	.07	180	17	.09		
			.04			.06			.14			.05		

Types of Decision	Average Discrepancy	Agreement
Decisions 1 & 2	.05	.95
Decision 3	.07	.93
Decision 4	.08	.92
Decisions 5 & 6	.07	.93

Overall Average Discrepancy: .07

Overall Average Agreement: .93

*O-D = Opportunities for Discrepancy
#D = Number of Discrepancies
PD = Proportion of Discrepancies

Table IV reports average discrepancies for tasks and types of decisions. It can be seen that the amount of disagreement is fairly consistent across tasks and types of decisions, except for the comparatively high level of disagreement over the chunking decision in Task III-6. The overall average agreement for coders across tasks, dyads, and types of decisions is 93%. Thus, the results of this third analysis agree with those of the first two analyses.

The three sets of results indicate that the coding system can be employed with a consistently high level of agreement regardless of coder, specific task or type or decision. Particular dyads may be somewhat more difficult to code than others, but even so, satisfactory agreement is maintained. This finding is of particular importance in light of the fact that both male and female dyads and Negro and white dyads were examined.